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POST-FIRE EVALUATION

AND

CHARACTERIZATION REPORT

Northern Region
1994

United States Department of Agriculture | Forest Service | R-1

Reply To: 1950/2430 Date: November 1, 1994

Subject: Post-Fire Evaluation and Characterization Report

To: Forest Supervisors

Attached is the Post-Fire Evaluation and Characterization Report for the Northern Region. This report recognizes the role of fire as a major component of the ecosystems of the Northern Region.

The report provides valuable information which will help you in placing the 1994 fires in context with the Region. It also provides information useful for priority setting and considerations when looking a post fire opportunities at the landscape and project levels.

Please feel free to call Steve Solem, Dan Castillo, Nan Christianson, or Tom Rhode if you have questions about this report.

Christopher Risbrudt
for DAVID F. JOLLY
Regional Forester

cc: Staff Directors

United States Department of Agriculture | Forest Service | Washington Office | 14th & Independence SW
P.O. Box 96090
Washington, DC 20090-6090

Reply to: 2430 **Date:** August 18, 1994

Subject: Expediting Fire Salvage

To: Regional Foresters

The 1994 fire season has created a significant fire salvage potential that needs to be addressed as soon as possible. National Environmental Policy Act and other process requirements, and the potential for appeals and litigation many times takes a significant amount of time during the preparation of salvage sales.

There are steps that can be taken to expedite the removal of fire killed and damaged timber.

Fire killed or damaged timber that, if not removed, could result in hazardous or unsafe situations, including the degradation of water quality due to siltation, should receive top priority for salvaging. These situations should qualify for emergency exemption from stay under 36 CFR 215.10 in the event the project was appealed.

Fire killed or damaged timber, which if not removed in a expeditiously manner would most likely deteriorate and may not qualify for the emergency exemption, unless the damaged trees became infested with insects that would subsequently infest green timber.

For potential salvage operations involving the above situations, the environmental analysis process should be initiated very early, even before or no later than immediately after the fire has been controlled. For other potential salvage operations where the timber is in less urgent need of removal, the Environmental Assessment (EA) process should be initiated as soon as feasible. Starting the EA process early, ensures the recovery of the highest timber value as possible. Waiting too long might result in values of the salvage timber that may not make it feasible to economically remove the salvage timber.

Categorical Exclusions have very limited possibilities in salvage operations.

Enclosed, for your information, is a letter to the Regional Forester in Region 5 approving an emergency exemption from stay on a beetle suppression project.

/s/STERLING F. WILCOX
GRAY F. REYNOLDS
Deputy Chief

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Post-Fire Evaluation
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POST-FIRE EVALUATION AND CHARACTERIZATION REPORT

Introduction

The 1994 fire season has been intense. Because of our rapidly increasing knowledge of ecosystem management principles and concepts and its application to our management practices, the Agency is looking at post-fire rehabilitation differently than in the past.

In the past, post-fire rehabilitation efforts have focused largely on salvaging the burned timber and getting areas back into timber production.

Today we are interested in using opportunities presented from the 1994 fire season to provide healthier ecosystems. To do this we will use a combination of tools that include salvage harvest, thinning, mechanical reduction of fuel loading, and careful use of prescribe burning. There are also areas where nature, through the use of wildfires, has helped us in the achievement of healthier ecosystems. No single approach will restore our ecosystems. To achieve healthy ecosystems we must first understand what the desired conditions are and then compare these to post-fire existing conditions. Once this is done we will know what actions are needed to move toward the desired condition.

In changing our look at post-fire rehabilitation and how fires have effected the landscape, instead of the site, it is necessary to look at the situation in a broader context. The broad inter-regional characterization and evaluation will help ensure Forests are consistent in their evaluations and Regional priorities can focus on areas that offer the best opportunities to move towards healthier ecosystems.

The goal of this effort is twofold: first to characterize post-fire conditions at the broad scale providing context, consistency, and priorities for Forests; and secondly, to provide information to the Forests that can be considered when doing finer landscape assessments and project analyses.

The following list of assumptions were developed to guide our efforts:

- Fire is a major component of the ecosystem
- Utilize EM principles
- Incorporate existing management direction
- Include terrestrial, aquatics, and the human dimension

The information generated should help assure consistency in our approach and should also provide information to Forests that can be used at the finer scale and for NEPA documentation.

Procedures

The goal of this report is to place areas burned in 1994 in context with the ecosystems with which they exist and our desired conditions of those ecosystems. To meet this purpose we will provide four products in this report: 1) bibliography, 2) information, 3) considerations, and 4) priority setting.

The bibliography provides a source of documentation that the forests can review for finer scale analyses. In addition, it provides the support documentation for considerations provided in the report.

The information section provides GIS layers and data. This data is in the form of GIS layers that are available for the Region. Data is summarized in tabular form as well as graphically. Forests are told in this report how to access this information for their own use. This information allows Forests to put their burned areas in context with neighboring Forests and the Region.

A Consideration section is provided. These considerations are not decisions but rather general rules about what the Forests should consider when they are evaluating the burned areas. These considerations tell the Forests how to use the information provided and identifies any additional information that may soon be available.

Finally, a priority setting process is developed. Based on the review of literature and information, a framework is developed that the Forests can use to set priorities. The framework takes into account broadscale considerations. This will help the Forests focus their analyses.

Purpose of Bibliography

Through this effort an extensive bibliography has been developed.

The bibliography is at the end of this report and includes information on fire history, wildlife, aquatics, and TES.

The bibliography can be used as an information source and as documentation during the NEPA compliance phase.

Information

Discussion on what we have

This section of the report highlights what information has been collected. It discusses some of the key layers of information and their utility. In addition, Appendix C provides a list of Regional GIS layers that can be accessed by the Forests for their use in post-fire analyses.

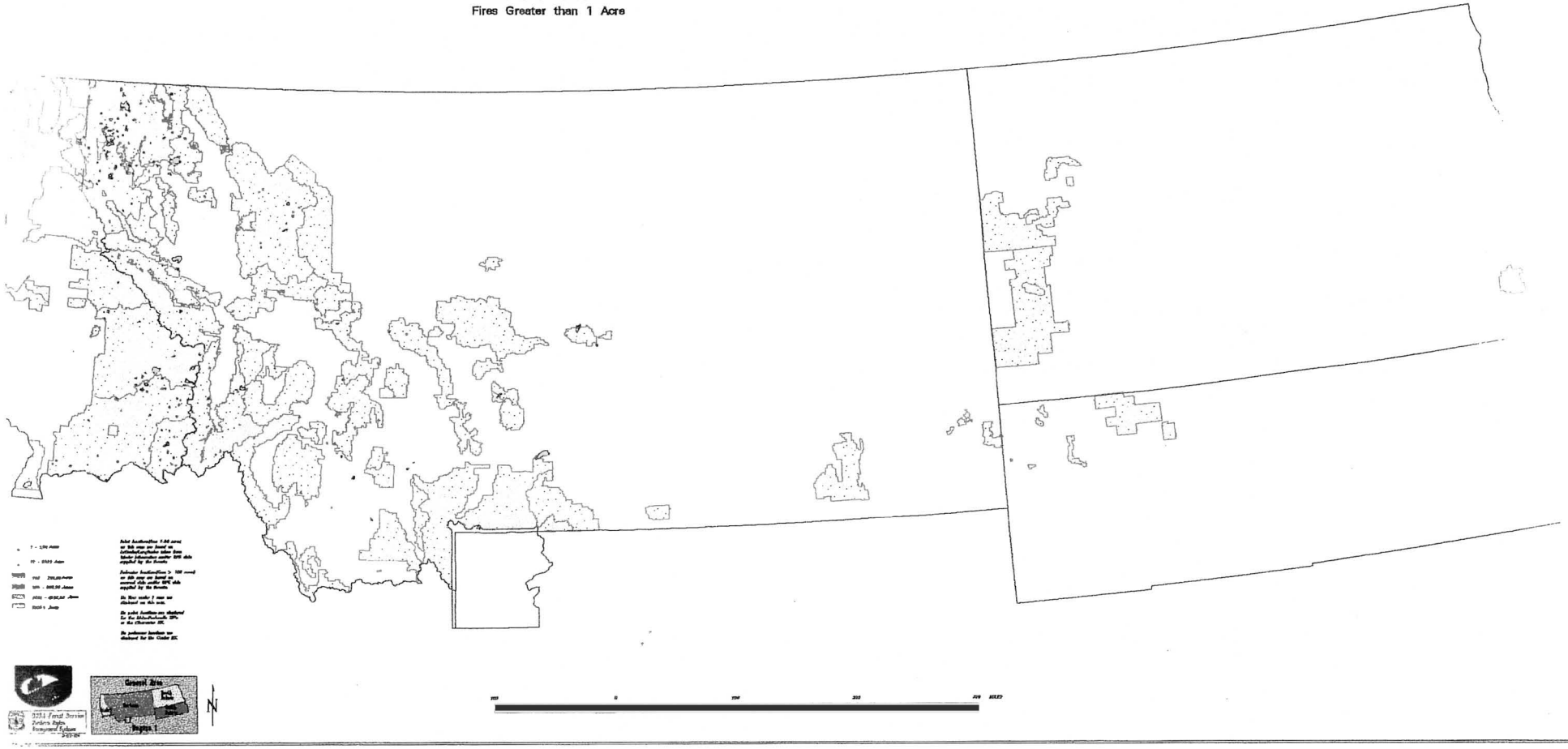
Fire Mapping

Fire information was collected for all fires in the Region, including those <.26 acres. The fire information map (Figure 1), locates all fires in the Region for the following categories: .26-9.99 acres, 10-99.99 acres, 100-299.99 acres, and 300-999.99 acres, 1000-4999.99 acres, and 5000+ acres and gives perimeter and location information for all fires > 100 acres.

FIGURE 1

1994 Fires

Fires Greater than 1 Acre



This fire information is current as of 10/26/94.

Appendix F lists all fires in the Region by name and size.

The map on page 3 should allow Forests to put into context their fires with respects to their neighbors.

Table 1 provides the number of fires by each fire size class.

TABLE 1 TOTAL ACRES BY SIZE CLASS

Size	Number of Fires	Acres
A	1,269	217.51
B	479	1,265.54
C	108	4,391.30
D	39	6,708.00
E	42	25,561.00
F	36	66,249.00
G	9	89,828.00
Total	1,982	194,220.35

Management Area Categories

The purpose of Management Area Categories (MACs), (Figure 2) is to provide consistency in displaying current management allocations on Federal and other public lands. Table 2 provides a description of the MACs.

MACs have been numbered in such a way that as you move from MAC 1 to MAC 8, the human effects on ecological processes increases. Overlaying the fire location on the MAC map should help set priorities based on Forest Plan objectives. Table 3 provides fire acres by MAC.

Historical vegetation

This information can be used as a historic context for areas under analysis. This information can be viewed as an approximation of composition during the time period of 1900. It can be used as a reference point when considering composition of desired conditions for a given area. This is fairly broad scale information, but gives some idea of relative amounts of vegetation composition during the turn of the century. Figure 3 is a map of historic vegetation and Table 4 provides fire acres by historic vegetation.

TABLE 3: FIRE ACRES AND TOTAL ACRES BY MAC

Mgmt Area	Description	Burned Acres	Total Acres
1	Wilderness	33,769	7,294,753
2	Special Mgmt. Areas	787	398,037
3	Non-intensive Mgmt.	37,333	6,150,674
4	Concentrated Recreation Mgmt.	269	178,249
5	Intensive Mgmt. Forested Lands	40,069	11,044,759
6	Rangeland Intensively Managed	644	1,667,494
7	Intermingled Public/Priv. Lands	0.00	0
8	Concentrated Development Areas	0.00	53,832
9	Private Lands	5,053	2,222,668

These acres are approximate based on an overlay of Management Area Categories and scanned fire perimeters.

Other available information

Appendix C contains a list of all spatial information layers available from the Regional Office. Contact Jan Zarling or Kim Foiles for access to this information.

TABLE 2: MANAGEMENT AREA CATEGORIES

MAC	DESCRIPTION
1	Ecological processes such as fire, insects, and disease are essentially allowed to operate relatively free from influence from humans. Diversity resulting from natural succession and disturbances predominates and non-native vegetation is rare. Forest users must be self reliant and expect low levels of contacts with others. Few, if any structural improvement exists and travel is nonmotorized. Types of areas are: Designated Wilderness, and backcountry lands.
2	These areas provide for conservation of representative or particular rare and narrowly distributed ecological settings or components. This helps insure conservation of ecosystems or components that may provide important functions insuring overall sustainability of larger landscapes. The influences of humans on the ecosystem are sometimes evident. Types of human uses varies somewhat but generally is nonintensive. Travel is generally nonmotorized. Some of these areas help provide an important role under an adaptive management philosophy by providing a "natural" reference for areas heavily managed for particular objectives. These areas are often formally designated. Research Natural Areas, designated wild rivers outside of wilderness and other special areas are typically included.
3	Although the areas are characterized by predominantly natural appearing landscape, an array of management tools can be used to restore or maintain relatively natural patterns of ecological processes. This will result in some evidence of man's activities. Ecological values are in balance with human occupancy with consideration given for both. Resource management activities may occur but natural ecological processes and resulting patterns will normally predominate. Forest users may expect to experience some isolation from the sights and sounds of humans in a setting that offers some challenge and risk. Restrictions on motorized travel can vary from area to area and season to season.
4	Ecological values are managed to provide human recreational use but are maintained well within levels necessary to maintain overall ecological systems. Resource use for other values is not emphasized and has little impact on ecological structure, function, or composition. Human use is recreation oriented. Sights and sounds of humans, on site can be expected and even desired. Motorized transportation is common.
5	The areas are primarily forested ecosystems and are managed to meet a variety of ecological and human needs. Ecological conditions will be maintained with an emphasis on selected structures and compositions within the range of natural variability. These lands often display high levels of investment, use and/or activity, density of facilities; and evidence of vegetative manipulation activities. Forest users expect to see other humans and evidence of man's activities. Facilities in support of various resource uses are common. Motorized transportation is common.
6	The areas are primarily grasslands ecosystems and are managed to meet a variety of ecological and human needs. Ecological conditions will be maintained with an emphasis on selected structures and compositions within the range of natural variability. These lands often display high levels of investment, use and/or activity, density of facilities, and evidence of vegetative manipulation activities. A wide variety of structures and composition is present. Forest users expect to see other humans and evidence of man's activities. Facilities in support of various resource uses are common. Motorized transportation is common.
7	Public lands are intermingled with private lands to the point that ecosystem management objectives are tempered by other landowner uses and objectives. Human activities have altered the natural appearances in most of these areas, both on private and public lands. Sights and sounds of humans are predominant. Private land use is often residential. Resource use is not planned on a sustainable basis but may occur in concert with surrounding private land values. Motorized transportation is common.
8	Ecological conditions (including processes) are likely to be permanently altered by human activities beyond the level needed to maintain natural appearing landscapes and ecological processes. The areas are generally small. Ecological values are protected where they affect the health, and welfare of human occupancy. Areas such as mines and other concentrated uses are included. Human activities are generally commercial in nature and directly or indirectly, provide jobs and income. Motorized transportation is common.

FIGURE 2

Northern Region Management Categories

FIGURE 3

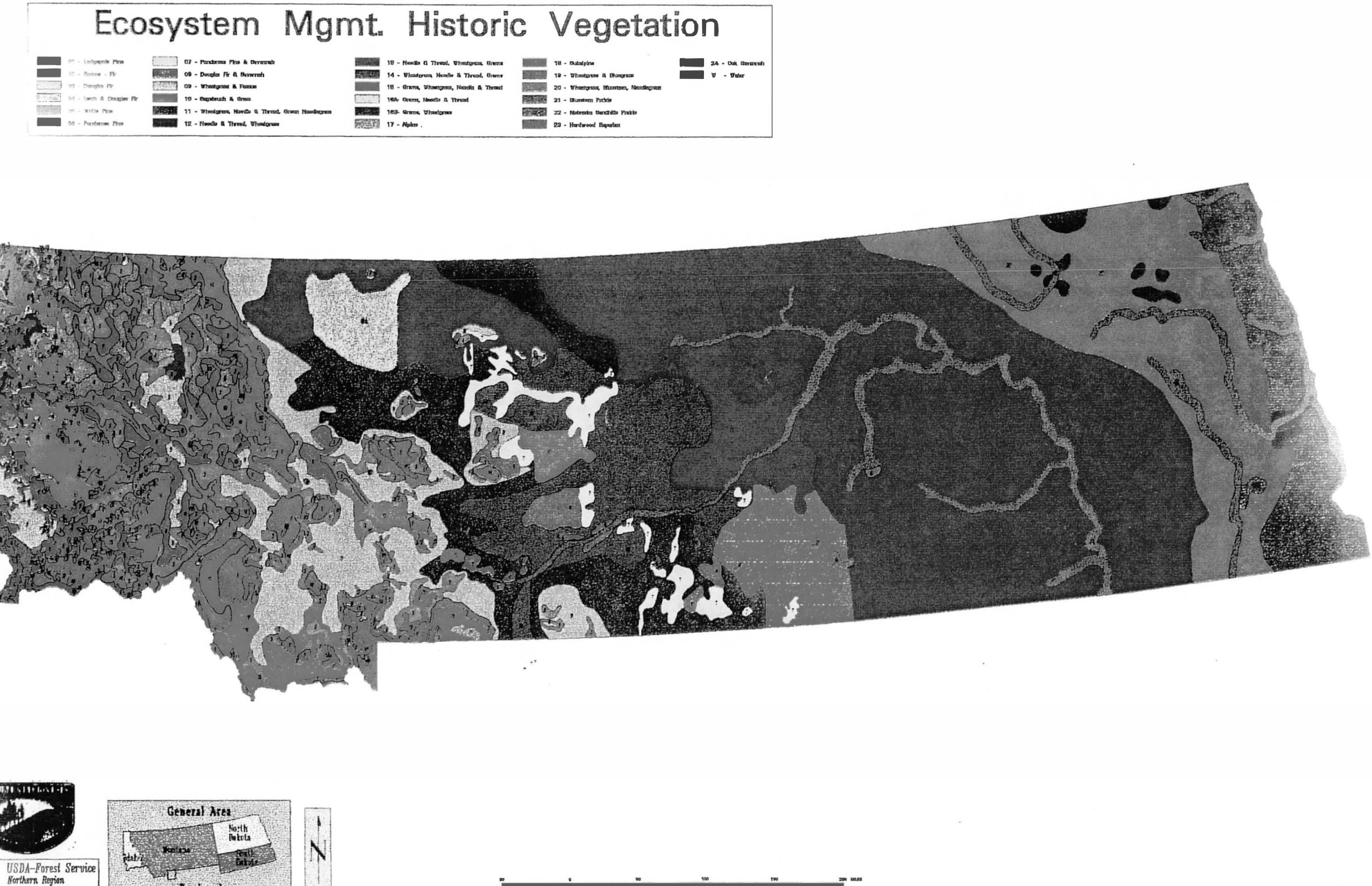

Ecosystem Mgmt. Historic Vegetation
01 - Lodgepole Pine
02 - Spruce - Fir
03 - Douglas Fir
04 - Larch & Douglas Fir
05 - White Pine
06 - Ponderosa Pine
07 - Ponderosa Pine & Savannah
08 - Douglas Fir & Savannah
09 - Wheatgrass & Fescue
10 - Sagebrush & Grass
11 - Wheatgrass, Needle & Thread, Green Needlegrass
12 - Needle & Thread, Wheatgrass
13 - Needle & Thread, Wheatgrass, Grama
14 - Wheatgrass, Needle & Thread, Grama
15 - Grama, Wheatgrass, Needle & Thread
16A- Grama, Needle & Thread
16B- Grama, Wheatgrass
17 - Alpine
18 - Subalpine
19 - Wheatgrass & Bluegrass
20 - Wheatgrass, Bluestem, Needlegrass
21 - Bluestem Prairie
22 - Nebraska Sandhills Prairie
23 - Hardwood Riparian
24 - Oak Savannah
W - Water
General Area
North Dakota
Montana
South Dakota
Idaho
Region 1
N
USDA-Forest Service
Northern Region
Management Systems
01-OCT-1994

TABLE 4: FIRE ACRES BY HISTORIC VEGETATION TYPE

Historic Vegetation Type	Burned Acres	Total Acres
Lodgepole Pine	16,865.23	8,690,625
Sagebrush & Grass	2,703.60	3,893,986
Subalpine	17,619.11	4,511,033
Wheatgrass & Bluegrass	768.49	605,071
Spruce - Fir	21,051.69	2,329,741
Douglas Fir	18,516.29	7,250,571
Larch & Douglas Fir	28,847.17	3,786,113
White Pine	9,743.36	3,037,692
Ponderosa Pine	16,682.57	6,530,954
Wheatgrass & Fescue	9,694.73	12,316,201

The above acres are approximate - based on scanned perimeters of fires greater than 100 acres.

Considerations

The section provides considerations for the Forests use when evaluating fires at the landscape level. Table 5 summarizes these considerations. The remainder of the section provides additional discussion and rationale.

Table 5: Post-Fire Considerations Summary

Consideration of Influences of Disturbance Factors

- Considerable delayed mortality of scorched and undamaged trees occurs for at least four years following fire.
- There is a direct correlation between percent defoliation by fires and subsequent attack by insect species.
- Rate of deterioration of killed timber varies by tree species.

Vegetative Considerations

- Seek opportunities to restore and/or maintain ecosystems.
- Where possible leave tree size-classes in proportion to historical occurrence.
- Emphasize areas that require no road construction.
- It is expected that in a given landscape a portion of the burned areas will be retained.
- Utilize the accompanying literature when determining the appropriate sized buffers along streams in conjunction with historic disturbance regimes.
- Post-fire areas with high numbers of large snags may need to be maintained if a deficit in large snags exists.
- Consider the opportunity to conduct ecosystem management activities in areas surrounding the post-fire area.

Wildlife/Aquatic Considerations

- Strive to retain all the elements of this years fire.
- Thick barked trees are preferred for woodpeckers.
- Rather than salvage across burn areas, take trees from part of a burn and retain intact other portions of the burn.
- Where snags are in short supply use this opportunity to supplement habitat.
- Effects of fires should be looked at in context of the landscape.
- Existing guidelines and literature for addressing big game needs are adequate.
- Fires probably pose no significant change in use or habitat of far ranging furbearers.
- Protect wet meadows, fresh water ponds, and streams for amphibians.
- Recognize and retain large woody debris and snags for small mammals and bats and aquatics.
- Follow existing TES guidance.

Sensitive Plant Consideration

- Location of known occurrences in or near burned areas.
- Life history with respect to fire.
- Presence of suitable habitat in or near burned areas.

NEPA Considerations

- Current appeal rules allow for exemption from stay for certain emergency situations.
- Economics is not a criteria for determining an emergency.
- Categorical exclusions can be used in same instance.

Forest Health

Forest health has been defined many ways by a number of people. Perhaps the most succinct definition is that of Aldo Leopold (1949), "the capacity of the land for self-renewal". In the booklet "HEALTHY FORESTS FOR AMERICA'S FUTURE--A Strategic Plan" (USDA 1993), it says, "A desired state of forest health is a condition where the biotic and abiotic influences of the forest..... do not threaten resource management objectives now or in the future." Yet another definition with less emphasis on commodities comes from Monnig and Byler (1992); "A forest in good health is a fully functioning community of plants and animals and their physical environment. A healthy forest is an ecosystem in balance." A more ecological definition is offered by Hagle (1994). She states "Forest health is a condition typified by succession and disturbance functions occurring within the natural range of amplitudes and periodicities. They provide for a natural rate of nutrient and energy flows within forests."

Criteria and a map identifying priority geographic areas in Region 1 based on forest health criteria can be found in Appendix E.

Considerations of the Influences of Disturbance Factors

Healthy forests are in a continuing state of change. Such disturbance factors as fire, insects and disease can accelerate and influence direction and rate that change occurs.

Fire can be looked at as a starting point along successional pathways. The directions these pathways lead, and the rates they proceed are significantly influenced by insects and diseases. The roles these agents play in influencing forest succession are a function of such things as stand and site conditions, species composition and structure, extent and intensity of fires, etc.

A number of factors that influence the ability of individual trees to survive the effects of fire are:

1. Site and vigor-- Trees that are old, slow growing, or on poor sites have the lowest probability for survival.
2. Season in which the fire occurs-- Fires that occur late in the season occur when conifers are least susceptible to fire damage.
3. Percent of crown scorch and/or crown consumption-- The amount of damage to buds, twigs and foliage is critical. For example, ponderosa pine may have severe foliage injury, but only slight damage to buds and twigs.
4. Extent of cambium damage-- Cambium killing that extends up the bole several feet or more reduces the chance of tree survival more than injury near the ground.
5. Presence of insects.
6. Soil moisture during the season following the fire. (Wagener 1961; Dieterich 1979).

In developing post-fire strategy in response to the fires of 1994, the following information should be considered:

1. Considerable delayed mortality of scorched and undamaged trees occurs for at least four years following the fire. Amman, et al. (1994) found that following the 1988 fires in Yellowstone National Park delayed tree mortality attributed to fire injury and subsequent insect attack greatly altered the original fire-killed/green tree mosaics that were apparent immediately after the fires. Bark beetles and wood borers were the main insect groups involved. For most tree species, susceptibility of insect infestations increased with increased fire injury.

   It was found that not only were fire-injured trees killed by these insects, but significant mortality of apparent uninjured trees occurred in the mosaics of fire-killed and green stands.

   Mortality rates varied considerably among tree species. Delayed Douglas-fir mortality occurred in about 32 percent of the trees that survived the fires. About 19 percent of this was attributed to delayed fire-injury effects and about 13 percent due to bark beetles and wood borer infestation. Nearly 52 percent of the lodgepole pine that survived the fires died within four years. Of this about 31 percent died from fire-injury, about 18 percent due to insects, and about 3 percent to unidentified causes.

   Similar patterns occurred with Engelman spruce, but sub-alpine fir and whitebark pine had only 37 and 36 percent of the trees surviving four years after the burn, respectively.

Gibson (1988) found extremely heavy infestations of wood borers infesting the ponderosa pine on the Northern Cheyenne Indian Reservation in September, in trees that had been fire killed the previous June. He stated that "wood borer infestations are sufficiently high in most areas that much of the timber value in these trees has been lost."

2. There is a direct correlation between percent defoliation by fire and subsequent attack by some insect species. For example data from California shows the following relationships between fire caused defoliation and the western pine beetle (Dale 1987):

Percent Defoliation by Fire	Percent Trees Killed by WPB
0-25	0-15
26-50	13-14
51-75	19-42
76-100	45-87

3. Deterioration of Fire Killed/Fire Damaged Timber:

With the exception of the loss of chip value and reduction in by-product value which is handled as an an unusual condition entered on the TEA Appraisal ($7.26 Westside, $3.45 Eastside-NR), fire damage and deterioration are handled as volume reduction as opposed to value reductions. The TEA Appraisal alters values based on defect and volume per acre. Fire damage is handled as seen defect at the time of cruise, while fire related deterioration is handled as volume reduction estimated to the midpoint of contract. For the purpose of helping determine what deterioration might be expected, the following guidelines have been prepared. These are guidelines and are not intended to replace local experience and knowledge but to be used with local experience and knowledge to estimate the volume that might be salvaged from fire killed and damaged timber.

Breakage is also represented in the volume reduction % tables that follow in this report, so do not double enter this form of loss. Experience has shown that over-estimation is common in determining the loss of timber volume due to fire damage plus deterioration to the time of harvest removal.

Factors

Factors affecting the rate of deterioration are: tree species, species characteristics, tree diameter, growth rate, age, site conditions, fire severity and time of year. There are many interrelations among factors and different combinations result in different rates of deterioration.

Species

Starker (1934) published tables rating tree species in order of fire resistance. For Northern Rocky Mountain areas the relative fire resistance of tree species in decreasing order of resistance are: western larch, ponderosa pine, Douglas-fir, grand fir, lodgepole pine, western white pine, western redcedar, Engelmann spruce, mountain hemlock, western hemlock, and subalpine fir.

Bark is a protective covering; trees with a thinner bark are more susceptible to damage and deteriorate more rapidly than those with thicker bark. Bark is thinner in tops of trees encouraging drying and increasing loss from weather checking.

Sapwood is the first merchantable part of trees to be degraded by insects and stain and decay fungi. Volume of sapwood is a function of species, size, and age. Trees with smaller sapwood volume decay more slowly than trees with relatively larger proportion of sapwood. Sapwood deteriorates faster than heartwood in dead trees.

Size

A large-diameter tree generally will deteriorate more slowly than a small-diameter tree; a younger tree will deteriorate more rapidly than an older tree. Wide annual rings deteriorate more rapidly than trees with narrow rings. Butt logs deteriorate more slowly than the upper logs. The percentage of volume lost in the butt log is less than that lost in the upper log because of the smaller percentage of sapwood.

Site

Excessive moisture or extreme dryness can limit or stop deterioration; moisture is the limiting factor for fungi and insects on a dry site. Combinations of conditions that promote growth of deteriorating agents will lead to rapid rates of deterioration. Aspect, elevation, slope, and soil all influence the rate of deterioration by affecting the temperature and moisture of a site.

Severity

Less severely burned trees on moist sites tend to deteriorate more slowly than those severely burned; the opposite is true on dry sites. Fires occurring in late summer will not be attacked by bark beetles until the following late spring/summer, thus allowing more time for salvage.

Agents

Agents affecting deterioration are: insects (primarily beetles), stain and decay fungi, and weather. Insect attack usually precedes fungal attack and provide the mechanism for introducing micro-organisms at accelerate sapwood deterioration.

Insects — Insects are very active in the first year; insect infestation in late spring and early summer attack weakened trees causing mortality. Beetle attacks caused limited deterioration, but introduce fungi. Beetles that mine the sapwood are usually the first to attack trees. Heartwood borers are most significant, continuing to develop after trees are felled and logs milled, causing increased loss in value.

Fungi — Spores cannot penetrate bark; they must enter through a break in the bark. Stain is the most important form in the first year after fire, continuing through the third year (when sapwood decay becomes primary). Stain in softwoods cause little structural damage, but does cause loss in grade (appearance).

Decay fungi causes reduction in strength properties rendering the wood useless from a structural standpoint (decreasing log volume). Sap rot becomes important in deterioration beginning the second year; under the right conditions, the sapwood may not be suitable for use after 3 years. The same fungi may decay heartwood.

Other — Weather checking generally occurs in the top log of larger trees where there is less volume to be lost. Smaller trees and those with thin bark are more susceptible to weather checking. Checking can provide an infection course for fungi. Volume loss attributed to it is usually negligible when compared to insects, stain, and decay.

Breakage in felling results in volume or value loss; fire-killed trees tend to have more breakage than green trees. The loss is concentrated in the lower value material of the upper stem.

Pulp chip volume will decrease due to char and decay. Chip value would decrease if chips were low quality and sold as hog fuel.

Rates

Because many variables influence deterioration, there are no complete tables that tell how much volume or value is lost because of fire. Each stand is unique; each tree is unique. Blue stain will appear within the first year. By the second year, some of the sapwood will be decayed. After three (3) years, the sapwood of most softwoods has deteriorated beyond use. After the fourth year the rate of volume loss remains fairly constant from year to year.

Douglas-fir (cubic/board foot volume loss in percent)

years after	"young-growth"			"intermediate growth"	
fire	11-20	21-30	31-40 inches	31-40	41-50 inches
1	25/30	13/20	12/14	5/ 8	6/10
2	53/60	28/33	22/28	14/19	13/15
3	65/80	40/48	33/42	20/27	20/23
4	70/92	50/60	45/55	28/31	23/27
5	80/99	60/70	53/63	35/36	25/31

Ponderosa pine (cubic/board foot volume loss in percent)

years after	'diameter in inches'					
fire	10"	20"	30"	40"	50"	60"
1	25/50	22/45	18/40	18/35	15/31	13/28
2	54/85	48/77	42/70	32/61	28/55	25/49
3	88/89	78/87	69/78	62/70	55/64	48/58
4	92/93	84/90	75/83	70/75	65/70	58/65
5	98/99	90/93	85/88	80/82	75/77	72/73

White (true) fir (cubic/board foot volume loss in percent)

years after	'diameter in inches'					
fire	10"	20"	30"	40"	50"	60"
1	23/25	20/22	14/16	12/14	11/12	11/12
2	80/95	66/78	50/60	45/52	42/49	40/48
3	88/95	76/86	62/70	56/63	53/60	51/58
4	92/95	81/90	72/79	69/74	66/72	64/70
5	96/98	90/95	84/87	81/84	80/83	80/82

Lodgepole pine

If lodgepole is going to be removed in the first four months following harvest, it should be coded as live, cruised for seen defect and a cull and breakage factor applied. Normal breakage should be increased by about 1/4 due to increased brittleness of fire-killed timber. Do not add any factor for deterioration to the time of harvest.

For lodgepole where harvest will take from 4 to 18 months from time of fire kill, the volume reduction built into the dead classification is adequate in determining deterioration. Do not give an allowance for breakage.

For lodgepole where harvest will take from 18 to 24 months, classify as dead and add 6 percent for additional deterioration. For lodgepole where harvest will take from 24 to 36 months, classify as dead and add an addition 16% for deterioration. Again do not give an additional allowance for breakage.

Note: Spruce more closely approximates lodgepole than it does the information listed for whitewoods.

Vegetative Considerations

Post-fire projects are similar to our other vegetation management: they are a way to get from the existing condition to a desired condition, while meeting social and economic goals. Now that the Forest Service has adopted an ecological approach to forest management, a different approach to decisions on "salvaging" burned timber must be adopted. Some considerations in developing an Ecosystem Management approach are given below.

Currently, fire suppression and salvage logging has reduced post-fire communities, habitats, and, in some instances, species ranges to a small fraction of their former acreages. Given our incomplete understanding of the ecological role of fire and post-fire ecosystems and their component parts, post-fire forest management will include maintaining a representation of this post-fire assemblage of ecosystems and their component parts across the landscape.

Forest Considerations

The need to develop desired Forest conditions should emphasize maintenance of ecological including both species native to a particular landscape as well as the ecological processes while leaving a "natural" looking landscape after the post-fire activities have been completed. Specifically:

> In an analysis area, understand and estimate the extent of post-fire forest habitat types most likely present today without fire suppression. Comparison of the historic estimate to existing extent by post-fire forest type provides a context for the IDT to develop and describe desired future conditions. This comparison is regardless of Management Area designation.

The following considerations should apply:

> Where possible leave tree size-classes in proportion to historical occurrence. All sizes of burned trees have function in contributing to soil maintenance, immediate and long-term nutrient cycling, water storage-movement, providing nest-foraging sites, etc.
>
> Emphasize for harvest those areas that require no construction of new roads. Utilize existing roads to maximum extent possible in watersheds where roads exist. Consider harvest opportunities in "non-timber" management areas only where it moves us towards restoring the ecosystem and meeting forest plan goals. Harvest activities along streams and in riparian areas should permit adequate recruitment of large woody debris to provide for stream ecosystem function.
>
> Loss of snags over time in some forest types has created a serious deficit in some areas and in some forest types, particularly in ponderosa pine and western larch. Post-fire areas with high numbers of large snags may need to be maintained if a deficit in large snags exists.

Consider the cumulative effects of planned salvage on other ownerships.

Consider the opportunity to conduct ecosystem management activities in habitats surrounding the post-fire area

Select harvest methods to emulate historic disturbance regimes. This includes development of stand structures that develop following mixed-severity fires, low intensity but frequent ground fires, etc.

To ensure maintenance of species populations, any salvage should be done within the range of natural variability and historic disturbance patterns. It is expected that in a given landscape a portion of the burned areas will be retained.

Include a No Action Alternative.

Consider the potential for prescribed fire and or harvest in areas near post-fire habitats to meet ecosystem management objectives based on stand-specific or Ecological Land Unit desired future condition.

Be consistent with the concepts and principles of ecosystem management established by the Forest Service, Columbia River Basin project, and Northern Region and Forest Plan direction.

The "fine filter" level of approach (looking at individual species) is part of the process. Some species, particularly those that are Threatened or Endangered, require specific consideration.

Seek and emphasize opportunities to restore and or maintain ecosystems including characteristic ecological processes in post-fire and adjoining areas.

Wildlife considerations

Wildlife in Northern Rockies evolved with fire and, therefore, the occurrence of fire should not be viewed as a catastrophe from a wildlife perspective. In fact, when viewed from the standpoint that roughly 99 percent of the Region did not burn and that there is a large group of species that benefit from fire, the results of this years fires can be seen as somewhat of an asset to manage for wildlife.

Fire is not the end result of a process--but rather the entry in to a series of events that shape the land and affect wildlife. It is important to consider the situation by looking back in time at historical patterns that shaped the current vegetation and looking ahead in time to ascertain how this fire season will shape future vegetation. This includes considering the affects on several scales. Local, site specific fire effect may cause immediate, short term changes for some species; eg. loss of a nest tree, forage loss for a season, or cover loss. At the mid-scale, changes may reflect the pattern of vegetation within a drainage and be expressed as a new source of seeds for some bird species. modification of cover; forage ratios on summer range for ungulates, or a source of stressed trees for beetles which will attract woodpeckers and a host of secondary bird species. At the large scale, one must look at how these fires fit into the existing mosaic of vegetation

across the forest and determine how they contribute to the maintenance of diversity. The concept of context is extremely important, especially at the large scale. Here, fire can be seen in its most elemental form-- as an ecological process that shapes the vegetation across the landscape over time. The results of any fire in the past can be seen in the species and patterns of vegetation and the current years fire can best be viewed as to how it will fit into this pattern and affect future conditions.

In a diagrammatic sense, here is a way to look at wildlife effects.

In general, post-fire management should strive to retain all the elements of this years fire; eg. vegetation that burned in all intensities and in different stands across the forest. This should not be a problem as most of the fires will not be accessed for followup action and those that are further managed offer opportunities to retain representative elements of the fire.

Snags--Birds

This year's fires provide the opportunity to recognize and retain burned vegetation that supports a host of avian species. Hutto (draft 94) has identified over 80 species that utilize early fire succession sites. Many of these are migratory species (70 percent plus) that nest in the northern Rockies and winter to the south (neotropical migrants) as well as several woodpeckers that are of special concern (eg. black-backed woodpecker). In general, existing data do not provide any clear perspective on long term historic population changes for bird species in coniferous forests in Western North America (Hejl, 94). Data are few and mostly for breeding birds. However, due to human expansion and development, it is intuitive that species associated with old growth, snags, and fire are probably less abundant than historically and fire exclusion from fire dependent forest habitats may be of equal significance in effecting change (Hejl, 94).

With that thought in mind, the effects of this year's fires can be viewed as an important change on the landscape that will benefit many forest avian species.

Among the 80+ species Hutto (draft 94) documents in early fire succession, several are seen to be very dependent on this stage and, in the case of black-backed woodpeckers, distribution is nearly restricted to standing dead trees associated with crown fires. This association is driven by the presence of primary bark beetles that are attracted to dying and damaged trees associated with recent fires (Amman and Ryan 91). These fire associated outbreaks last for several years and then decline. Both the insect and bird species that capitalize on these effects are mobile and able to find and exploit recent fires (Hutto Draft 94).

Considerations for recognizing and managing key elements of these burns in order to provide habitat for benefitting species seem to focus on the following parameters:

1) Degree of burn intensity--Canopy fires that defoliate trees, scorch or burn the bark but do not burn or dry out the inner bark provide a suitable host site for beetles (Amman and Ryan 91, Hutto draft 94). Without the ability for beetles to utilize burned trees, a significant element in post-fire wildlife benefits is lost.

2) Species of tree--Hutto (draft 94) determined that Douglas fir, ponderosa pine and western larch supported 47-80 percent feeding use by woodpeckers while Englemann spruce, lodgepole pine and subalpine fir demonstrated 0-2 percent use. Clearly, thick barked trees are preferred, probably because of the insulating ability of the bark and the need to retain a moist inner bark to support beetles.

3) Stand Conditions--Hutto (draft 94) recommends retaining intact stands because of the ability of birds to exploit different micro-habitats. Therefore, rather that salvage across an entire burn area, it is probably better to take trees from part of a burn and retain, intact, other portions of a burn. This has the added benefit of safety considerations as well.

4) Pre-existing conditions--Hutto (draft 94) found that snags which were present in a stand before a fire (also aspen) were used disproportionate to their availability after a fire. Recognizing and retaining pre-existing snags in recent burns is important. This concept can be expanded on a mid scale basis as well. Where recent fires created new snags and future snags via delayed mortality and where existing conditions reflect a paucity of snags due to recent harvest or other conditions, there is an opportunity to retain and manage snags. It is important to view this opportunity at the broader level in order to retain diversity within a landscape. Use this opportunity to supplement a habitat that is in short supply by leaving numbers of snags in excess of normal standards.

5) Scale--Hutto (draft 94) does not clearly recommend a scale of application. However, it is important to "step back" when viewing the effects of recent fires and attempt to place individual burns in context with the landscape. Over 5000 fires occurred in the Region. Many were small but will contribute to local diversity and probably will not be salvaged. Larger fires offer the opportunity for closer examination and identification and retention of key attributes. Hutto reports (draft 94) that bird abundance did not vary with burn size and that relative bird abundance varied among species and across the landscape. He concludes that each site may be differently suited for occupancy by various species. Therefore, developing a landscape perspective and retaining representative elements of this years fires across the landscape seems most appropriate. Rather than simple 50:50 "give and take" guidelines, recommendations should reflect burn intensity, preferred tree species, retention of existing snags, and a landscape reflection of availability.

Reserve Trees/Safety

Potential reserve trees in the work area need to be evaluated to determine if a hazard exists. Although reserving trees for wildlife can be challenging, with some forethought, they can be safely retained. Appendix G "Guidelines for Selecting Reserve Trees" provides a basis for achieving the objective of retaining reserve trees in concert with safe work practices and forest and wildlife management goals.

Big Game

In general, big game species have evolved with and adapted to fire. Given the scale of this years burns it seems unlikely that the direct affect of fire will pose any problems except, perhaps, on same site specific local scales. It is far more likely that suppression and salvage efforts pose a much higher likelihood of disturbance and the development of new access.

In general, this year's fires reflect opportunity for big game. Recognition of burn sites that will benefit species that prefer early successional stages, e.g., mule deer and big horn sheep, and appropriate followup is an opportunity.

Losses in key cover components may be off set by access restrictions until conditions change. Stand replacement fires may offer the opportunity for planting mixed conifer species stands for future cover needs.

Access developed by suppression efforts should be analyzed and, in general, closed to use.

Site specific loss of forage destined for winter use may be recognized, but on a population level will probably not be of significance. This may not hold on big horn sheep winter range and warrants some investigation.

Existing guidelines and literature for addressing big game needs are adequate for responding to this year's fires.

Fine Filter and TES

Once a Forest has completed a coarse filter assessment, an evaluation of the fine filter aspects of the wildlife, fisheries and botanical resources is required. This is especially true for Threatened, Endangered and Sensitive species, but is also important for species where there is a concern for species viability or where species have some specific ecological, economic and/or social value.

Forests should evaluate the extent to which any given species should be addressed on a given landscape. Once such a determination is made, Forests should use the best available habitat information and conduct effects analyses for these species in a manner similar to that used for other projects. As is other aspects of implementing EM, the desired habitat conditions for species addressed at the fine scale must fit into the overall context and habitat strategy developed for the next higher spatial scale.

Forests should follow current TES direction.

Furbearers and Wide Ranging Carnivores

Fur furbearers and carnivores with large home ranges, it is important to consider activities at a landscape, National Forest or larger scale. With rare exceptions, it is most likely that the direct effects of the fires had little impact on these species. However, fire rehabilitation, salvage of burned timber, and/or reforestation activities could result in increased disturbance and measurable changes in prey base densities.

Forests should use existing methodologies to ensure adequate coordination for grizzly bear and wolf habitat. Draft guidance for lynx, wolverine, and fisher has been provided to the Forests and should be reviewed and validated with more site specific data prior to use. For other furbearers and carnivores, Forests should use the best available information from literature, Conservation Strategies, species/habitat models and local information.

Amphibians and Reptiles

We suffer from a lack of information of these species groups. However, we do know that amphibians have shown striking declines among some species (e.g., spotted frogs, leopard frogs) and that reptiles, in general, seem to be present in historical numbers and distribution (Manno, pers comm). This is not a situation unique to the northern Rockies, but is likely regional in scope. However, anecdotal evidence from the post-fire situation in the Yellowstone ecosystem offers encouragement. Reichel (pers comm) reports both amphibians and reptiles present in burn areas and apparently "holding their own" in the aftermath of major fires.

The focus of our concern for amphibians will likely be wet meadows, fresh water ponds and streams where reproduction and the early developmental stages are focused (e.g., eggs, larvae). This is also especially true for salamanders and, therefore, in post-fire activity, the identification and protection of these sites is very important. It is likely that fires, per se, did little to damage these sites directly. However, indirectly, fires may have altered the conditions which provided for the presence and maintenance of wet sites. This may be partially offset by vigorous rehabilitation efforts with a focus on restoring vegetation conditions that contribute to and favor these wet sites and streams.

Of significant concern will be the recognition and protection of these sites during post-fire rehabilitation and salvage efforts. Any new road development, salvage harvest operations, and rehabilitation should consider these sites. The fires have provided an opportunity for large woody debris as well. Recognition and retention of large diameter standing and down material is an asset in providing shelter and food sources for a number of reptiles and amphibians. Large standing snags can benefit avian and mammalian species initially and, when down, continue to provide for herpetofauna also.

Small Mammals

Undoubtedly, given the intensity of the fires in many instances this year, conditions amenable to small mammals were completely destroyed. Many fires burned with high intensity and destroyed ground vegetation, trees, downed woody material and snags. Prey sources for species like marten, and downed woody debris conditions which are conducive to marten use, are gone from some sites. However, it is likely than any affects to small mammals from this fire season will be very site specific, generally short lived and will probably not be evident due to our lack of data. Again, consider that in the Kootenai case, 98 percent of the forest did not burn and of the burned acreage, many are small fires and contain a mosaic of burned and unburned conditions. Some sites will provide an abundant seed supply for some small mammals and could be recolonized very quickly. Other sites will take time to recover, support a community of small mammals and, ultimately, the predators that they support.

Recognition and retention of large woody debris and snags will be important to small mammals (including bats) as well as other species. Again, this component of fires has the capacity to provide variable and long term benefits to many species and it is very important to recognize and retain large snags and large downed trees where available.

Sensitive Plants Considerations

Post-fire analysis regarding sensitive plant species should be coordinated with the appropriate Forest or District botanist or sensitive plant coordinator. General factors to consider include, but are not limited to:

1. locations of known occurrences in or near burned areas. Consult the element occurrence databases for the area of concern (the "TNC" database on the DG).

2. life history of species (with respect to fire tolerance).

3. successional relationships (i.e., associated seral stages).

4. presence of suitable habitat in or near burned areas.

Further information on effects analysis for sensitive plants is available in the relevant chapter in the Regional desk reference "Our Approach to Effects Analysis."

Sensitive plant species that are likely to be involved in post-fire analyses include, **but are not necessarily limited to** those taxa listed in Appendix D. **ALL pertinent species from the Regional sensitive species list should be included in biological evaluations and other evaluations related to post-fire analyses.**

Aquatics Considerations

A review of the available literature was conducted to develop this fire salvage policy in regard to the aquatic resource.

Policy

National Forests in the Northern Region have a vital role in the conservation of native and desired non-native aquatic organisms. The USDA Forest Service has the primary responsibility for management of aquatic habitats on National Forest System Lands. The Forest Service, in coordination and cooperation with other agencies and interested parties, will address aquatic habitat management in National Forest project plans within the context of multiple-use goals and objectives.

It is the Policy of the Northern Region of the Forest Service to provide consistent management for aquatic resources on National Forest System Lands throughout the Region, and to ensure that management actions demonstrate an ecological stewardship perspective. With the advent of recent fires in the Region this consistent policy is critical. Following existing law and utilizing the best available scientific information, all Forests involved in salvage operations will consider the information provided in project design.

Post-Fire Habitats: Consideration of Needs for Aquatic Resources

All the scientific literature reviewed demonstrates a need to retain snags and unburned trees on-site to maintain ecologically robust conditions essential to the "health" of the aquatic ecosystem (References attached). A summary of the post-fire successional process for watersheds, and how this contributes to long-term health of the aquatic system is described below.

The death of trees and subsequent loss of canopy protection due to a wildfire generally has indirect effects on aquatic ecosystems. The primary agents of change that have both positive and negative consequences instream include a nutrient pulse and organic litter change, a long-term increase in light levels and subsequent increase in riparian and stream temperatures, a substantial drop in evapotranspiration and a dramatic increase in spring flood flows, and an episodic input of large woody debris. These change agents in turn trigger instream physical and biological responses.

Macroinvertebrates

(Immediate: 24 hours to one week post-fire)

Diversity and biomass remain the same except in rare instances where lethal low oxygen and/or high temperature conditions were a factor. Oxygen depletion effects typically occur in low gradient, shallow and slow 3rd order streams and negatively impact insect communities. Adverse effects to macroinvertebrates due to radiant stream heating from the fire most likely will occur in shallow streams.

(Short-term: 1 week to 1 year post-fire)

In general, there will be a decrease in the quality of food available to stream insects until a new shrub community develops. However, during the first spring run-off food quality increases at many sites as fire litter is washed downstream.

(Mid-term: 1 year to 20 years)

Diversity and biomass of stream insect communities is enhanced due to a nutrient flush, increased light levels and an increase in riparian litter. Insect production far exceeds pre-fire levels especially during the period 5-10 years post-fire.

(Long-term: over 20 years)

Macroinvertebrate community stabilizes to pre-fire and immediate post-fire levels.

Fish

Fish are a beneficiary of natural wildfire and the recovery processes. Seldom is a fire intense enough to cause direct mortality. Fish retreat immediately after a burn due to increased temperature, turbidity and habitat instability. Fish refound burned tributaries rapidly as increased flows offset increased temperatures from lack of shade. Increased nutrient input stimulates food production which increases fitness and biomass. This increased reproduction serves to reconnect isolated populations through straying. This in turn maintains genetic fitness and diversity of isolated populations. Fish respond to the mid-term explosion of food organisms with equal biomass increases. Some studies indicate that what we thought were productive fisheries were only suppressed populations which respond with an equally dramatic population increase after fires.

Large Woody Debris

Large Woody Debris (LWD) in forested streams is one of the most important contributors of habitat and cover for fish populations (MacDonald 1991; Meehan 1991). Large wood is a major component of channel form and pool formation in smaller streams (Sullivan et. al. 1987). LWD influences channel meandering, bank stability, variability in channel width, (sediment retention?), and form and stability of gravel bars (Lilse 1986).

Fire is the primary natural process for the delivery and persistence of LWD in the stream channel. Although flood flow erosion, windthrow and forest disease processes contribute some (chronic) LWD, it is the infrequent pulse events like fire that contribute the bulk of riparian and stream LWD. Consequently, to maintain aquatic resource health and productivity at something approaching a natural rate, LWD must be allowed to fulfill its function in shaping the aquatic environment.

Although large-scale "pulse" events can occur for other reasons (insect, disease, blow-down, etc.), these events are rare. Fire is the primary agent in the recruitment of wood to streams. Fire induced "pulse" events can occur during the fire, from post-fire blow-down events, and during spring runoff as bank cutting occurs. This "pulse" recruitment of wood to the stream channel through fire mortality is critical as LWD availability sharply decreases with the juvenile stands that follow the fire. The most intense, stand replacing burns generally occur in headwater drainages (1st and 2nd order) tributaries. LWD recruited to these streams have been shown to supply LWD to fish bearing streams (3rd to 5th order) streams through flood processes over time. This is critical at this time as these streams are suffering from a LWD deficit due to historic debris removal policies.

LWD also plays a critical role of sediment retention in streams. Fire greatly increases erosion potential from adjacent slopes, roads, and stream channels. During the first few post-fire spring runoff events, sediments (which usually include spawning-sized gravels) need to be retained in the channel as future recruitment of gravels will be limited to rare catastrophic flood events. Just as critical as gravel recruitment is role that peakflow effects have in "cleansing" a watershed. Peak stream flows which occur post-fire remove the finer sediments and deposits them in floodplains or behind LWD, and leave behind clean gravels and cobbles essential for fish and insect production.

Without fire-induced LWD recruitment, two scenarios can occur:

1. Sediment will move through the system and accumulate in downstream reaches where private land and human water consumption occur - the subsequent turbidity can result in major fish kills and mortality to other aquatic organisms.

2. All but the largest sediment particles will move out of the system leaving the stream with little available spawning habitat. Studies have shown that the best spawning habitat conditions for salmonids occur from 5-10 years post-fire.

LWD serves a major role in the post-fire nutrient cycle. Initial pulses in nutrients following fire are absorbed in fine sediments. These sediments, when stored behind LWD represent a long-term reservoir of nutrients that are released over time through the litter-flow-sediment-LWD process. The wood itself represents a significant nutrient source which contributes to the long-term productivity of the stream ecosystem.

Finally, LWD is critical to the stream's ability to stabilize and reshape its channel. Post-fire conditions result in large amounts of sediment to the stream channel and significant increases in peak flow. Without instream LWD for stabilization, sediment-laden waters during peak flows act as an erosive agent which can severely degrade/unravel the channel and directly kill aquatic organisms. Both old and newly recruited LWD will reduce the severity of the post-fire flow and sediment effects. The presence of LWD, 5-10 years post-fire, is critical to the stream's ability to rejuvenate its channel and provide the complex habitats necessary for a diverse aquatic community and optimum biotic productivity.

In summary, fire gives the aquatic ecosystem an opportunity to rejuvenate just as it does for the land. It gives land managers the single greatest opportunity to cheaply restore degraded habitats. If we can understand and accept the short-term loss of use of all the resources affected, we will reap a long-term recovery process that will yield healthier watersheds and more productive aquatic resources. Natural wildfire recovery processes are consistent with our desires for management in an ecosystem context.

Heritage Resource Considerations

This section discussess procedures for compliance with appropriate Historic Preservation laws and policies with regard to FY95 post fire salvage efforts.Procedures will vary between Idaho and Montana. This reflects the fact that Forests in Idaho are operating under a current Programmatic Memorandum of Agreement with the IDSHPO and Advisory Council on Historic Preservation which contains expedited processes for fire related salvage. A similar statewide agreement is now being developed for Montana but may not be in place by the FY95 field season.

Our interim approach in Montana is to support the Kootenai and Flathead NFs, which contain 95 percent of post-fire salvage timber, in their efforts to rapidly develop a short term agreement with the MTSHPO addressing 95 salvage. Other Montana Forests will address small post fire salvage projects under the standard consultation process defined in 36CFR800. Eventual implementation of the statewide agreement for Montana will provide streamlined procedures for all Montana National Forests.

The process for Idaho is described below.

1. Introduction:

   The objective of the following narrative is to outline an expedited process for meeting NEPA and National Historic Preservation Act (NHPA) requirements. This narrative is drawn from "Cultural Resource Management and NEPA Documentation - R1 Analysis and Guidance," (March 30, 1992) and the draft programmatic agreement regarding "The Identification, Evaluation and Treatment of Historic Properties on the Idaho Panhandle, Clearwater and Nez Perce National Forests of Idaho".*

2. Areas Previously Inventoried for Cultural Resources:

   The programmatic agreement cited above allows the Forest to use existing cultural resource inventories that cover new project proposals. If the previous inventories adequately cover the area, then no new inventories or consultation with the State Historic Preservation Officer (SHPO) are needed. This information is documented in the project record file and the decision and project implementation can proceed.

The agreement cited above also allows for "standardized avoidance procedures". If cultural resources are known to occur in an inventoried area and standardized avoidance procedures are used, no further consultation is required. This information is documented in the project record file and the decision and project implementation can proceed.

3. Areas Not Inventoried for Cultural Resources:

If the area of potential effect is less than 200 acres** and this area has a low sensitivity in regard to cultural resources***, the project can proceed with no field inventory and without consultation with the SHPO. The basis for determining that the area has a low sensitivity is documented in the project record file and the NEPA process and sale could be completed. The use of this provision will be monitored by the Forest and reported yearly to the SHPO, the Advisory Council on Historic Preservation (ACHP) and the Regional Office.

If the project area is determined by the Forest Archaeologist to be sensitive for the occurrence of cultural resources based on background research, then the area must be inventoried, the findings documented and the recommendations reviewed by the SHPO. If any cultural resources are found during the inventory, they can be avoided using any standardized avoidance procedure or custom procedure mutually agreed upon by the Forest, SHPO and ACHP through consultation.

The requirements for NEPA can in some cases be met by gathering existing information (literature, cultural overviews and previous inventories in the vicinity, etc.) and putting relevant portions of this information in the project record file prior to a decision****. A field inventory and consultations with the SHPO can follow the decision, but must be completed prior to the actual sale. Any recommended adjustments in project design agreed upon between the Forest and the SHPO would be made prior to the sale date.

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* This agreement brings current practices into compliance with 36 CFR 800 by obtaining prior concurrence with the ACHP. The agreement also allows a new way to meet our National Historic Preservation Act responsibilities where the area of potential effect is less than 200 acres.

** The size of the "area of potential effect" is determined in consultation with the cultural resource specialist.

*** The Forest Archaeologist determines sensitivity on the basis of the amount of the area exceeding 35% slope and knowledge of the cultural sensitivity of adjoining areas.

**** This could be a useful course of action in cases where snow cover prevents a timely field inventory of the area of potential effect.

NEPA Considerations

Past experiences with appeals has shown that a well-defined Purpose and Need Statement is critical to project accomplishment and public disclosure. Appendix H is an example of a Purpose and Need Statement and Decision Memo. The 1994 fires have created a situation where we need to redefine purpose, as stated earlier in this document, it's not business as usual. We need to be able to answer "why are we considering this proposed action" and what is the relationship between the existing condition and achievement of goals and objectives described in Forest Plans, Forest Health Initiative and Ecocsystem Management.

Current appeal rules allow for exemptions from stay certain emergency situations. Appendix H provides criteria and procedure if an emergency declaration becomes necessary. Current rules allow for exempting from stay of implementation, this is quite different from the past where exemptions from appeal were possible. A point to consider before initiating an emergency declaration is that economics is no longer a criteria for determining an emergency.

Categorical exclusions may be used for timber sales less than one million board feet and an example of the decision memo required for a categorical exclusions is in Appendix H. Use of cat ex's do not preclude analysis of the proposed project, it does however preclude a formal EA or EIS. The key points here are the determination that there are no adverse effects regarding extraordinary circumstances and public scoping has occurred. The project work file and decision memo must be a part of the cat ex.

Priority Setting

Regional Priority Setting Process

Existing post-fire conditions should be evaluated on a Regional-broad ecosystem basis as well as a broad forest-wide scale.

Regional priorities. The Geographical Planning Areas (as identified by the Forests) with the highest priority are:

Forest types with a structure unlike that evident prior to intensive fire control. For example, the change from a fairly open park-like condition in the Douglas-fir or Ponderosa Pine forest types to a multi-story, closed forest structure and in areas of urban-wildland interface.

Areas of significant wildland-urban interface.

Forest types, particularly Douglas-fir and Ponderosa Pine, that exhibit a forest structure unlike that evident prior to intensive fire control but without significant wildland-urban interface.

Areas where significant departures from historical conditions have lead to significant forest health problems, for example mountain pine beetle and white pine blister rust, but lack significant wildland-urban interface.

Forest types with structures close to historical conditions. Appendix E provides prioritized geographic areas and the criteria and procedures used to do the prioritization.

Process for setting priorities:

The following represents a process that can be followed when setting priorities.

Step 1: Understand site, fire, fire history, ELUs/LTAs, Forest type, I&D

Step 2: Overlay allocations, existing conditions, and special situations

Step 3: What are the immediate needs - ecological, social, legal

Step 4: What are the short term needs (1-5 years)

Step 5: What are the long term needs (> 5 Years)

Step 6: Prioritize needs

Approach for the Priority Setting Process:

The following is an approach forest can use to set priorities. The steps are as follows:

1. Assemble an interdisciplinary team with the objective of assessing the 1994 fires from a broad, landscape-level ecological approach and to assign priorities.

2. Assess the fires from a forest-wide landscape perspective, assessing whether or not the fires are within the ecological ranges.

   In order to satisfy this objective ecologic management land units must be delineated. Within the ecological management land units consideration should be given to whether or not the fires burned within a historic range of intensity, frequency, patch size, etc. Another objective is to determine if there is a restoration or rehabilitation need.

3. Fires must also be assessed from a perspective of the Forest Plan. Determined whether or not the fires met existing Forest Plan management allocation objectives.

4. If the fires met neither EM nor Forest Plan objectives, the fire would be a high priority for restoration, rehabilitation, and/or salvage. If some of the objectives were met, the priority would be lower.

Fire can be categorized based on the following:

1. High: Neither EM or Forest Plan objectives met
2. Medium: Either EM or Forest Plan objectives met
3. Low: Both EM and Forest Plan objectives met.

5. Broad, forest-wide sideboards must be developed in response to issues related to: watershed, soils, vegetation, wildlife habitat, fisheries, sensitive plants and animals, logging systems, and transportation systems.

The ID Team should keep the following in mind as they go through this process:

1. Don't get into too much detail.
2. This has not been done before, don't get frustrated.
3. Will the information be beneficial to the districts?
4. Give the districts as much room as possible within which to operate.
5. This is not business as usual.

Tables 6 and 7 shows how this information can be summarized. Table 6 displays the matrix and documentation for one fire. Table 7 summarizes the information for all fires.

Immediate, intermediate and long-term restoration and rehabilitation needs not covered by the immediate fire suppression rehabilitation efforts were noted for these fires. In addition, a brief logic for coming to a team conclusion should be stated. General, broad-based issues, opportunities, and considerations should also be briefly documented for each fire.

TABLE 6: Fire Name

ECOLOGICAL RANGES			ACTIONS	FOREST PLAN OBJECTIVES	
EM Land Unit	Patch	Intensity	Restoration Rehab	MA	Does it Meet MA Obj.?

Documentation:

Conclusion:

Consideration:

Recommendations:

Opportunities:

Priority:

TABLE 7: Summary of Priorities For Forest Recovery Forestwide

Area	Fire Name	High	Medium	Low	Opportunities

Criteria to be considered in Step 6 of the Priority Setting Process:

Using the criteria in Table 8 will help the Forests identify their priority areas for vegetative treatment.

TABLE 8: VEGETATIVE CRITERIA FOR SELECTION OF A PRIORITY FOR FOREST VEGETATION TREATMENTS IN BURNED AREAS

PRIORITY	CRITERIA
1	Areas where fires occurred during 1994 which historically contained a fairly high percent of ponderosa pine or Douglas-fir and in some cases other species, that were in a fairly open grown park-like condition. This park-like condition was maintained by a fire regime dominated by understory,(non-lethal) burning and or with some mixed fire regime. If fires burned in these types with a stand replacing intensity, opportunities for salvage and reforestation should be pursued. The objective of salvage is to return these areas to a structure more compatible with historic process and function.
	The structure of these forest types were/are likely outside the range of the historical, today being more a multi-story, closed forest, rather than an open park like forest community. Efforts within ***and adjacent to*** the fire perimeter in these types should be given highest consideration for restoration and rehabilitation to a composition and structure more resistant to stand replacing fire and more resistant to insect and disease that seem to commonly plague these dense forest communities presently. Areas in this class that also occur within or adjacent to wildland-urban interface should be given even more consideration in view of future potential of large fire impacts to structures.
	It is important to recognize that events such as the 1910 fire may have burned with such intensity that resulting vegetation today may not have commonly occurred for long periods of time in the past. Additional tools, and methods may be needed in such areas to identify what had more typically been the the processes leading to a common range of composition and structures in these areas.
2	Forested areas that have experienced stand replacing fire this year that are within areas that historically burned with that intensity. Salvage, reforestation and other rehabilitation efforts should be aimed at structures and compositions that will provide dense forest cover in the future. These areas may have historically had a very high number of snags with few live trees for several years following the stand replacing event.
3	Forested areas that burned during 1994 with a low intensity, non-lethal fire, or a mixed lethal and non lethal where historically the fire regime was quite similar should be considered for any appropriate salvage or rehabilitation opportunities. These treatments should develop forest conditions and structures that will maintain or lead to future fire potential and insect and disease levels that are compatible with sustaining the forest structure commonly occurring now or in the past on this type. This situation may not have as many opportunities for priority salvage efforts as the previous situations. These conditions may be fairly normal and somewhat stable in regards to their composition and structure in relation to processes such as insect and disease, fire and nutrient cycling.
	However, these types may have large areas adjacent to the fire that were not burned, that could benefit from some type of thinning activity (as an example) to reduce potentials for stand replacing fires or future forest health problems. These areas may likely be high priority areas under the Forest Health Initiative.

Recommendation for Further Actions

Monitoring Needs

1. Effect of re-seeding on succession in burned areas
2. Effect on sensitive plants from burning - need area with pre-burn inventory
3. Effect of burns on cultural resources
4. Invasion on non-native species after burn on sites with and without salvage operations.
5. Assessment of early post-fire succession on wildlife species.

Others

1. Fire intensities - lethal, non-lethal, mixed lethal
2. Integrate our effort with Region 4.
3. Enter bibliography into the citation retrieval system.

SUMMARY and CONCLUSIONS

The goals of this report were to characterize post-fire conditions on a broadscale providing context, consistency, and priorities for Forests; and secondly provide information to the forests that should be considered when doing finer landscape assessments and project analyses. Were these goals met? By providing a bibliography, access to Regionwide GIS layers, and tabular information about the fires, consideration for insect and disease, vegetation, and wildlife, and the development of a priority setting process that forests can use when looking at post-fire situation, the goals were accomplished.

There is certainly more to be done. Additional needs are outlined in the further actions section.

The report outlines a process and provides information forests can use when evaluating post-fire opportunities. This is done in an ecosystem management context and incorporates existing management direction. The next step is to take similar kind of thinking and expand it from the burned areas and their surrounding landscape into the existing areas of the forests not effected by the fires of 1994; providing a process for future Forest Plan changes in those areas.

It is recognized that a short-coming of this report is in the social/economic area. The social/economic areas are important elements of ecosystem management. Forests should consider these elements when assessing post-fire areas.

The single most important thing to remember about the 1994 fires is their context. In the Region, 194,000 acres burned. Of that, 118,000 acres, or
61 percent, were fires greater than 100 acres on National Forest land. The amount of total burned acres on National Forest land is less than .5 percent.

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Appendices

Appendix A: Chief's Statement on Forest Health

Appendix B: Historical vegetation map/documentation and bibliography

Appendix C: Information Center - Spatial Data

Appendix D: Sensitive Plants Important in Post-Fire Analysis

Appendix E: Priority Geographic Areas Based on Forest Health Considerations

Appendix F: Fires by Forest, Name, Acres, and Size Class for Region One

Appendix G: Guidelines for Selecting Reserve Trees

Appendix H: Decision Memo, Criteria for Emergency Declaration, and Purpose and Need

APPENDIX A

STATEMENT BY JACK WARD THOMAS CONCERNING THE HEALTH AND PRODUCTIVITY OF THE FIRE-ADAPTED FORESTS OF THE WESTERN UNITED STATES

STATEMENT OF
DR. JACK WARD THOMAS, CHIEF
FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Before the
Subcommittee on Agricultural Research, Conservation, Forestry,
and General Legislation
Committee on Agriculture
United States Senate

Concerning the Health and Productivity of the Fire-Adapted Forests of the Western United States

August 29, 1994

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for the opportunity to offer my views on the health and productivity of the fire-adapted forests of the Western United States. I am accompanied by Dale Bosworth, Regional Forester for the Intermountain Region and Steve Mealey, previously the Forest Supervisor for the Boise National Forest, now the Team Leader for the Upper Columbia River Basin Environmental Impact Statement Team. Also testifying for the Forest Service today is Dr. John Lehmkuhl, Research Wildlife Biologist from the Pacific Northwest Research Station.

Overview

This year's wildfires have brought to the public's attention a forest health problem that had its beginnings over 100 years ago. In Idaho, and in much of the West, the health of National Forests, other Federal lands and private and State lands is closely related to changes in the historic role of fire on those lands.

The forest health problem and associated high intensity wildfires are indicators of an ecosystem that is not in balance and the concerns will not go away when cooler and wetter fall weather arrives. The same problems will be with us next summer and each summer in the future unless we recognize that some actions are necessary to return fire to the environment in a way that achieves desired outcomes, to improve forest health and reduce the risk that fire will damage site productivity or destroy human life and property.

Background

I would like to spend a few minutes talking about the underlying causes of what has resulted in today's forest health problems.

Low Elevation Forests

Prior to the 1880's, low intensity fires, both lightning caused and those set by Native Americans, burned periodically through summer and early autumn. In the extensive, dry forests where ponderosa pine, and in some areas, western larch were the predominant species, fires burned every 5 to 30 years. These frequent fires maintained low levels of both standing and ground fuels, burning mainly along the ground rather than in the tree crowns. These ground fires perpetuated open, parklike stands of fire resistant ponderosa pine and western larch with minor components of Douglas-fir and white fir. These open, mixed species stands were much more resistant to insects and diseases.

High Elevation Forests

At higher elevation, where there is more moisture and growing seasons are shorter, the historic fire pattern was more complex. Fires occurred at longer intervals, between 50 to 300 years. Fires in this ecosystem had more variable effects, in some cases killing all the trees. In other cases, low intensity ground fires occurred. These fires produced a mosaic of forests composed of various ages and densities of Englemann spruce and subalpine fir. Forests in this mosaic were more resistant to insects and disease than the dense fir stands which dominate many of these sites today.

Lodgepole Pine

Another forest type that covers over 15 million acres in the West is lodgepole pine. This type can tolerate a wide range of climatic and soil conditions and is often found naturally in dense stands. Fires occurred historically at intervals of 60 to 300 years and were related to mountain pine beetle epidemics which periodically created vast areas of heavy fuel loads. Such heavy fuel loads, combined with the current drought that began in the 1980's, produced the large, stand replacement fires that burned over 1 million acres in the Greater Yellowstone Area in 1988.

Role of Fire Suppression and Timber Harvest

By the 1880's - with elimination of Native American burning and the settlement of western valleys, and the advent of livestock grazing - fire frequencies in many fire adapted forests decreased dramatically. Fire suppression was routinely employed to protect homes, grazing lands, and timber resources.

These fire suppression efforts became more effective after World War II due to increased access via roads, smokejumpers, helicopters, and the use of fire-retardant drops from aircraft.

The nature of the forests was also affected by timber harvesting, beginning in the early 1900's, which concentrated on the larger, more valuable species such as ponderosa pine and western larch, leaving behind the lower value firs.

Forest Health Concerns

Insects, disease, and wildfire are normal compoments of ecological processes in these areas. When the ecological state of the forest is dramatically altered by fire suppression, and other management practices, the role of insects, disease, and wildfire are likewise altered. The frequent, low intensity fires of the past created forests that were ecologically more stable than the forests of today. The current forest conditions, particularly in low elevation areas, are more susceptible to insects, diseases, and stand replacement fires than have been observed and recorded before.

For example, Douglas-fir and white fir now dominate these sites in densities far greater than when ground fires burned at frequent intervals. Hence the habitat for defoliating insects that attack fir species is enriched. The problem has been exacerbated by the recent and continuing 10-year drought which has increased the stress on the densely stocked trees, making them even more susceptible to insects and disease.

Taken together, the interaction of human influence and natural events resulted in an ecological condition that is frequently described as a "forest health" problem.

Forest health problems are now widespread across the inland West where open stands of ponderosa pine and, in some areas, western larch once dominated. These ecosystems make up a major portion of the forests in Idaho, the eastern Cascades, portions of California, and the Blue Mountains in Oregon. In addition, some high elevation and lodgepole pine forests have forest health problems.

The problem culminates when such stands, with very heavy fuel loadings resulting from tree mortality, burn at very high temperatures and over extensive areas. Such high energy fires are much more damaging than former fires, because the dense fir stands, containing or dominated by dead trees killed by insects and disease, provide a means whereby fires can "ladder" into the tree crowns, including old growth trees. These "crown" fires produce higher-intensity, rapidly-spreading fires that are difficult or impossible to control. Such fires can heat soils so excessively, that for some years afterwards, nutrient levels are drastically lowered and the soils actually repel water, causing significant watershed and water quality impacts as well as with problems with tree regeneration.

Once stand replacement fires occur, all forest resources are dramatically altered. Even with aggressive restoration and rehabilitation, it commonly takes years to restore productive forest stands and ecosystems.

Urban/Wildland Interface

Everyone has seen the daily news reports that show the loss in lives and personal property caused by this year's fires in the West.

In these areas, called the "urban/wildland interface," there are also significant forest health problems and concern with wildfire effects. These problems are dramatically magnified when more and more people build homes in natural settings where fires historically burned every 5-to-30 years. Wildfires on these lands produce enhanced risks for local, State, and Federal fire protection personnel. In deciding where to use our firefighting resources, current policy is to first protect life and property. However, the training given to wildland firefighting agencies is protection of natural resources. Therefore, they do not have the equipment to fight structural fires. In large wildland fires on urban-interface lands, city and county fire departments cannot protect every home.

What I am saying is that all of us concerned with wildfires and the loss of life and property must begin addressing basic, common sense, fire prevention and fuels reduction guidelines for these areas. For example, State and local governments need to address building codes necessary for "firewise" construction and for providing adequate access into these interface areas for evacuations and fire equipment. And, all of us involved with firefighting in this urban/wildland interface need to increase our public education and involvement to assure "firewise landscaping."

The Forest Service can only take direct actions to reduce this wildfire risk on National Forest System lands. It is for others to decide whether or how to address this risk on private lands.

However, we need to begin to find ways to reduce the wildfire risks at the urban/wildland interface. If this is not done, we will continue to find ourselves having to deploy our fire suppression resources in the urban-interface that dramatically diminishes our capacity to protect natural resource values and prescribes the fire fighting strategy which may well not be the most effective, or safest, in the overall context of natural resource protection.

Solving the Forest Health Problem

Our strategic plan, "Healthy Forests for America's Future," completed in April 1993, recognized the seriousness of the forest health problem in the West. In this plan, a broader view of the interactions of fire, insects, disease, and ecological succession is taken as we move to the consideration and management of forests as ecosystems.

We cannot and should not wait until this broad view is described in every detail before initiating activities to reduce the wildfire risk on selected areas. For example, in areas where human safety and private property are at significant risk, salvage harvests, thinnings, and mechanical reduction of fuel loading can reduce the likelihood of high intensity wildfires. In other areas, careful use of prescribed fire after fuel loadings are reduced to acceptable levels to allow controlled burns, will be needed to reduce fuel loads.

However, in moving to address the long-term forest health problem, no single approach or action will fully address the fundamental forest health problems. This will require matching up management practices to achieve the desired future condition for each site and, in turn, the overall forest mosaic. The best foundation for determining this desired future condition is to complete a comprehensive scientific study of the processes that maintained a given forest type over time. An example of such a study presently underway is the Forest Service and Bureau of Land Management's Eastside Ecosystem Management Project for the forests of the Columbia Basin.

From these ecosystem assessments and the amendments to forest plans that will be based on this information, we predict an ecosystem management approach that uses the best scientific and technical knowledge to achieve a desired future condition. I want to be as certain as possible that the long-term actions taken to resolve current forest health problems do not result in a different set of forest health problems some decades in the future.

Specific Actions to Address Forest Health Problems

As I mentioned earlier, most of the West's forest health problems seem to be clearly related to the disruption of historic fire cycles and timber harvest practices of the period 1900-1990. We have a reasonable idea what can be done to alter these conditions based on the knowledge we gained from our ecosystem management test projects and from our ongoing ecosystem assessments.

The most basic is to compensate for the lack of short-interval, recurring ground fires. This can be achieved in several ways:

1. Identify landscapes that are currently susceptible to high energy burns rather than individual stands as the first priority for treatment to reduce fire danger and to enhance forest health. All land ownerships should be considered.

2. Seek to create a mosaic of stand conditions using prescribed fire, thinning, timber harvest, or mechanical reduction of fuel loading to produce conditions within the normal range of variation for the ecosystems involved.

3. Favor fire adapted species while conducting silvicultural activities to maintain stocking densities and species composition more resistant to insect attacks, less prone to crown fires, and able to withstand low energy ground fires at prescribed intervals.

4. Increase public education and involvement programs in cooperation with local and State agencies, concerning the interaction of fire exclusion, insect and disease problems and wildfire risks presented by the current forest conditions described earlier.

5. In urban/wildland interface areas, work with local and State agencies and the home building industry regarding access to developments adjoining public lands to increase the understanding of fire safety precautions necessary in building and property maintenance for those who live there.

6. Continue to work with the Environmental Protection Agency and State agencies to provide the flexibility to use prescribed fire in compliance with the Clean Air Act. Current regulations or smoke emission limitations on prescribed burning do not acknowledge the role of prescribed burning in reducing wildfire intensity - i.e., there is a trade-off between some smoke at frequent intervals or much more smoke from wildfires.

7. Within existing resources, revisit the current budget priorities for pre-suppression and fire suppression activities in terms of meeting fuel reduction and forest health needs.

I am happy to report that we have established a special team that is comprehensively evaluating ways to accelerate needed actions to improve forest health. This is reflected in the attached letter from Assistant Secretary Lyons. They are currently reviewing options on specific actions that could be taken. I need to state clearly that the agency's wildland firefighting personnel and equipment are stretched beyond the limit to simultaneously protect life, property, and natural resources. As a result, in some areas, protection of natural resources is not being adequately addressed.

Summary

We are faced with a serious forest health and wildfire problem in the Intermountain West particularly on the historic 5-to-30 year fire interval sites. The question is not whether these areas will burn, but only a question of when. The human and monetary cost of continued management inaction in these areas is and will remain high for forest resources and private property in the adjacent urban/wildland interface.

Priorities concerning areas to be treated should be set on the basis of protecting human life and property, economic efficiency, environmental effects, resources available, insect and disease risk, and capacity of industry of processing woody material removed from treated sites. Obviously, some areas should be left alone. Controversial areas for treatment will likely be by-passed in the initial thrust areas selected for treatment. However, these areas should be considered for treatment as fire allows and experience accumulates.

We have the basic knowledge to begin treatment of the forest health problem in the short-term by restoring high risk sites to some semblance of their historic condition. This can be approached through a combination of salvage logging, reducing fuels through mechanical means, prescribed fire, and thinning of densely stocked stands. These techniques should be applied in high risk areas as soon as the required environmental analyses are completed and public participation has occurred. Where there are threatened and endangered species, additional consultation with the Fish and Wildlife Service and the National Marine Fisheries Service may be necessary. There is however, a distinct possibility that response will be delayed by appeals and lawsuits. We will do our best to assure full compliance with the laws and with involving the public on actions being considered.

I need to remind everyone that the solution may require the re-allocation of existing funding to begin treating forest health problems. I am confident that in many areas it makes sense to take preventative measures now, rather than suffer losses and incur greater fire and pest damage at a later, but almost certain, time.

The solutions described also contains some risks. Despite our best efforts, some prescribed fires will escape and burn more acres, and more intensely than we had planned, and may, thereby, threaten life and property. The risks may be relatively small when compared to recurrent high intensity wildfire.

I am certain that critics will question the validity of new approaches on the basis that forestry practices of the past contributed to this situation. And, they will question any management effort that includes cutting trees as a solution to a forest management problem.

Yet, we cannot, in my opinion, simply step back and wait for "nature" to take its course. I do not believe that what has happened this fire season is acceptable as a solution to the problem. These fires at this scale and intensity, are too hot, destructive, dangerous, and too ecologically, economically, aesthetically, and socially damaging to be tolerable. We have learned much about fire science since the 1950's. It is time to begin to apply what we have learned with a new vision of what we want from our forests and our forest managers.

This completes my testimony. We would be happy to answer any questions you may have.

APPENDIX B

HISTORIC VEGETATION IN REGION ONE BY CLIMATIC SECTION

HISTORICAL VEGETATION IN REGION ONE BY CLIMATIC SECTION

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USDA FOREST SERVICE, NORTHERN REGION
MISSOULA, MONTANA

DRAFT REPORT
REVISION THREE

SEPTEMBER 14, 1993

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HISTORICAL VEGETATION IN REGION ONE BY CLIMATIC SECTION

INTRODUCTION

One of the underlying needs in implementing Ecosystem Management is an understanding of natural processes and the variability in vegetative structure that would have been present on our landscapes as a result of those processes. This need was recognized at the beginning of the Ecosystem Management Project initiated by the Northern Region in 1992. As a result two specific projects were undertaken to address this issue. A search of the historical literature to describe the "natural" vegetation structure and a study to describe the fire regimes associated with this structure. While many debates have raged about the term "natural" I have taken a very simplistic approach and use the term to represent the vegetation present at the time that significant numbers of Euroamericans settled the area. That this structure was at least somewhat stable can be documented with fire history investigations and bog analysis.

This paper is not complete in either its coverage of the vegetation or the other biota associated with the Regional landscape. For the vegetation portion the sources of information have only been partially investigated. This is particularly true for the grassland types in the eastern portion of the Region and to some extent the forested types. Efforts are ongoing to fill these voids and a more complete report should be available after the current field season. Other members will contribute information for other biota and by the end of the project an integrated assessment of the Region should exist. Todate the focus for investigation has been the area bounded by the Northern Region boundaries. This coverage will eventually be expanded to include all the area within the ecosystems associated with the Northern Rocky Mountains including Canada. The role fire played in developing our vegetative structure or fire regimes will be presented in another paper.

A map depicting historical vegetation in Region One has been developed. Information for forested areas in northern Idaho was taken from the timber surveys conducted during the 1930's. Grassland types were described following Kuchler (1964). Montana cover types were based on Morris (1964) and supplemented with information from the timber surveys, Kuchler (1964) and Ross (1976). North and South Dakota are based on Kuchler.

Specific information for forest cover types was obtained from the 1930's timber inventory for northern Idaho, western Montana and portions of eastern Montana. Survey level data from the 1940's was used for the remaining portion of eastern Montana. In most cases types described in these inventories followed those shown on the map. Minor types such as western redcedar, western redcedar-fir, western hemlock-fir and cottonwood were the exception. These types were limited and at the level of detail used in past mapping efforts were not of sufficient size to be mapped separately. Generally these types were found in narrow strips in riparian areas or moist benches or slopes. Unless otherwise stated age conditions presented in the discussion reflect the expected stand conditions in 1900. Area of the various cover types generally reflect the 1930's conditions.

The following descriptions provide definitions for the cover types as defined in the 1930's inventory and a general discussion of the modal type. When characterizing species composition of the various cover types, only species which represented more than 10 percent of the stand volume were included. Specific age and structure or departures from this model type are described in each Climatic Section.

Western white pine - Stands containing 15 percent or more of net cubic volume of white pine. This type was given priority over all other types. The heart of the white pine cover type was in north Idaho with some occurring in northwest Montana and northeastern Washington. The definition for this type permits a wide variety of conditions to be present. White pine generally made up more than a third of the stand volume however other tree species were more variable and any one species probably did not exceed 20 percent of the volume. Common associates were Douglas-fir, larch and grand fir with variable amounts of spruce, redcedar and hemlock. The type was commonly found on all but high energy slopes or upper subalpine environments. Stands tended to be dense with multi-layers common.

Ponderosa pine - Stands containing 25 percent or more of ponderosa pine. This cover type was normally restricted to broad valley bottoms or lower to mid slopes on high energy aspects. On portions of the type ponderosa pine formed almost pure stands. This was most common in the southern portion of Idaho and south central and eastern Montana where 50 percent of the type may have been in pure stands. In the extreme northern portion pure stands were found on less than 10 percent of the type. On stands that had mixed species ponderosa pine accounted for over 50 percent of the volume. Douglas-fir was present in significant amounts normally representing 20 percent or more of the stand. Larch was also a major component within its range. Stands commonly were very open with trees often grouped by age. Mature trees dominated most stands with savannah conditions common on the driest sites.

Larch-Douglas-fir - Stands containing 10 percent or more of larch and 75 percent of larch and Douglas-fir combined. The optimum development of this type occurred in northwestern Montana particularly around the Kalispell area and Swan and Clearwater valleys. The type was found on slightly drier sites than the white pine type and fewer species were present. Larch was the dominant species usually accounting for an average of 64 percent of the stand volume. Douglas-fir was also a significant species and normally accounted for 28 percent of the volume. Stands in Montana were dominated by larch with an average of 72 percent of the volume while in Idaho it accounted for about 41 percent. Douglas-fir was more common in Idaho accounting for 33 percent of the volume while in Montana it made up 26 percent. Occasionally grand fir in Idaho and Engelmann spruce in Montana exceeded 10 percent of the volume. While lodgepole pine was commonly associated with the larch type particularly in Montana it was typically young in age and did not account for a significant part of the stand volume. Stand structure varied by topographical position. Open grown stands of almost pure mature larch were common in the larger valley bottoms while stand structure was highly variable in age and compostion on other sites.

Douglas-fir - Stands containing 60 percent or more of Douglas-fir and less than 10 percent of larch. The Douglas-fir type exhibited its best development in the cooler, drier parts of western Montana and northern Idaho and the warmer

slopes in eastern Montana. It was commonly found on various aspects from low to upper slopes. Sites were normally dominated by Douglas-fir with it accounting for almost 75 percent of the volume. On high ridge lines or high energy slopes, stands were typically mature and open grown with a limited understory. Cooler north slopes were generally dense younger aged stands. Grand fir was a cohort within its range representing about 13 percent of the volume in Idaho. Ponderosa pine and larch were a minor component. Occasionally lodgepole pine made up more than 10 percent of the stand volume in Montana but was only a limited species in Idaho.

Engelmann spruce - Stands containing 50 percent or more of Engelmann spruce. The Engelmann spruce cover type was associated with the white pine types of north Idaho and northwest Montana. It was also a common type found in moist areas in eastern Montana. While not representing a significant portion of any Section it was common in riparian zones and high basins. Stands contained greater than 60 percent Engelmann spruce with grand fir the only other species of importance in the western portion of the type. Occasionally larch, Douglas-fir or white pine contributed more than 10 percent of the volume. In eastern Montana lodgepole pine or occassionaly subalpine fir were found in the type.

Lodgepole pine - Stands containing 50 percent or more of lodgepole pine. The type was common through out the Region particularly in the southern portion of north portion of Idaho and Montana and in eastern Montana. Stands were normally confined to the mid to upper slopes on all aspects normally in the drier environments. A wide variety of species could be cohorts and varied depending on climatic conditions. Grand fir, Engelmann spruce, and Douglas-fir were the most common associates along with white pine and larch. Of interest is the lack of significant amounts of subalpine fir during the 1900 time period. Stands were commonly dense with a great deal of deadfall and normally immature or younger in age. Occassionally mature stands were found particularly on gentle topography or areas that were sheltered from major wind events.

Western redcedar - Stands in which western redcedar predominates. The redcedar type represents only minor amounts of the Region. The major area of the type was found in Climatic Sections 8 and 9 where it occurred in the riparian zone of major wooded valley bottoms. Cedar normally dominated these locations with it representing greater than 60 percent of the volume. Occasionally western hemlock or grand fir represented greater than 10 percent of the volume. Stands commonly had limited ground vegetation with most stands well past maturity.

Western redcedar-grand fir - Stands in which western redcedar and grand fir predominate. Although of limited area, this type like the redcedar type was an important riparian vegetation type. It was also found on benches and moist slopes outside of the riparian area usually growing on optimum sites for tree growth. Either redcedar or grand fir were the dominant species with cedar always present and grand fir usually present in the stand. These two species usually represented 70 percent of the stand volume. Other species that may have been present were spruce, Douglas-fir, and occasionally western hemlock or larch. Stands commonly were dense with multi-layres. A variety of aged stands were commonly found.

Hemlock-grand fir - Stands in which 50 percent or more was hemlock and/or grand fir. This type was found in the same general conditions as the redcedar-grand fir type although temperatures may have been slightly warmer. Stand composition appeared to vary from stands dominated by hemlock to stands with 4 species that contain more than 10 percent of the volume. Hemlock and grand fir represented at least 50 percent of stand volume with varying amounts of Douglas-fir, redcedar, spruce and occasionally larch. Stand age and structure was similar to the western redcder-fir type.

TABLE 1 - PERCENT AREA BY COVER TYPE FOR ALL ACRES BY COUNTY IN IDAHO AND MONTANA - 1930's

NORTHERN IDAHO

COUNTY	WWP*	PP	L-DF	H-WF	DF	ES	LP	WRC	C-WF	SALP	NCF	NF
Benewah	35.3	22.5	12.8	0.6	0.9	0	1.8	1.0	1.7	0.6	5.9	16.9
Bonner	33.4	15.2	21.6	0.2	1.6	0.9	2.5	0.8	0.6	8.1	8.4	6.7
Boundary	24.6	10.0	17.7	0.3	1.2	6.3	5.4	1.2	0.2	21.5	4.5	7.1
Clearwater	49.4	6.5	7.2	1.2	1.8	0.9	5.6	0.6	2.6	9.4	10.6	4.2
Idaho	1.6	13.8	4.2	3.5	12.4	3.6	16.0	0.4	3.2	16.6	7.4	17.3
Kootenai	20.8	24.3	18.8	0.8	4.2	T	2.4	T	0.6	1.3	7.0	19.8
Latah	20.1	20.1	11.9	0.5	0.3	0	0.6	T	1.5	0	2.6	42.4
Shoshone	53.7	3.1	8.4	0.9	4.3	1.9	6.1	0.2	0.5	10.0	9.9	1.0
Nez Perce	0	15.3	2.3	0.3	0.6	0	0.8	0	0	0	1.1	79.6
Lewis	0	22.3	0.8	0	2.7	0	0.2	0	0	0	1.0	73.0
TOT N.Ida	22.4	13.0	9.1	1.7	5.9	2.1	8.1	0.4	1.8	10.7	7.3	17.5

WESTERN MONTANA

COUNTY	WWP*	PP	L-DF	H-WF	DF	ES	LP	WRC	C-WF	SALP	NCF	NF
Deerlodge**	0	0	0	0	2.5	0.2	24.7	0	0	1.7	19.6	51.3
Flathead	1.0	4.5	21.9	0.1	1.1	4.5	13.5	T	0	16.4	25.8	11.2
Granite**	0	4.2	0.3	0	19.2	0.7	34.0	0	0	9.0	6.2	26.4
Lake	1.4	17.6	17.4	0	0.4	4.3	4.3	0.1	0	2.5	8.5	43.5
Lew&Clark**	0	5.6	0	0	15.3	0.9	28.6	0	0	17.3	21.0	11.3
Lincoln	5.2	14.8	35.0	T	1.0	4.2	15.4	0.3	0.2	14.0	6.7	3.2
Mineral	2.5	31.0	25.0	0.2	1.2	0.3	6.9	T	0.2	13.3	17.4	2.0
Missoula	0.2	24.0	22.8	T	5.1	2.7	13.9	T	0	6.1	13.1	12.1
Powell	0	5.5	3.9	0	11.6	0.2	14.1	0	0	16.3	13.0	35.4
Ravalli	0	17.9	0.7	0	9.0	0.3	6.5	0	0	25.5	21.0	19.1
Sanders	6.8	24.5	21.8	0.2	1.7	0.1	3.2	0.1	0.1	7.5	16.1	17.9
Silverbow**	0	0	0	0	10.9	0.1	23.8	0	0	0.9	8.9	55.4
W Montana	2.0	13.7	17.3	0.1	5.1	2.3	13.4	0.1	T	12.9	15.5	17.6

N Idaho												
W Montana	11.0	13.4	13.7	0.8	5.5	2.2	11.1	0.2	0.8	11.9	11.9	17.5

CENTRAL MONTANA (portion only)

COUNTY	WWP*	PP	L-DF	H-WF	DF	ES	LP	WRC	C-WF	SALP	NCF	NF
CHOUTEAU	0	0.5	0	0	0.5	0	0.6	0	0	0	0.8	97.6
FERGUS	0	10.3	0	0	0.6	T	0.6	0	0	0	3.0	85.5
JUTH BASIN	0	2.5	0	0	7.2	0.1	7.1	0	0	0	7.9	75.2
Cen Montana	0	5.1	0	0	1.8	T	1.8	0	0	0	3.1	88.2

Total Area	9.0	11.8	11.1	0.6	4.8	1.8	9.3	0.2	0.7	9.7	10.2	30.8

* Cover type codes:
  WWP - Western White Pine
  PP - Ponderosa Pine
  L-DF - Larch-Douglas-fir
  H-WF - Western Hemlock-White Fir (grand fir)
  DF - Douglas-fir
  ES - Engelman Spruce
  LP - Lodgepole Pine
  WRC - Western Red Cedar
  C-WF - Western Red Cedar-White Fir (grand fir)
  ALP - Alpine (Above commercial Forest)
  NCF - Non Commercial Forest - Rocky, plus deforested cutover, nonstocked burn
  NF - Non Forest - Barren, Grass, Brush, Other
** West of the Continental Divide only

TABLE 2 - AVERAGE VOLUME PER ACRE BY COVER TYPE FOR COUNTIES IN IDAHO AND MONTANA (ALL ACRES) - 1930's

COUNTY	WWP	PP	L-DF	H-WF	DF	ES	LP	WRC	C-WF	AVG
Benewah	15.8	10.1	9.2	6.2	5.8	0	7.3	7.4	18.1	12.2
Bonner	15.7	7.2	7.0	9.9	6.2	9.1	6.8	20.2	9.2	12.2
Boundary	16.0	6.8	6.8	10.7	5.5	11.7	8.9	32.9	17.6	12.8
Clearwater	21.5	9.8	9.8	10.4	10.7	15.4	7.8	16.6	13.8	17.9
Idaho	15.1	10.1	11.2	9.8	7.8	11.3	5.6	23.2	10.6	10.1
Kootenai	16.4	8.8	10.4	15.5	7.0	0	5.2	0	7.8	12.7
Latah	15.2	9.1	7.9	7.6	7.8	0	0	6.0	9.1	9.9
Shoshone	17.2	9.8	11.4	11.6	10.7	13.0	6.7	12.8	11.2	15.0
N. Idaho	18.5	9.6	9.7	10.1	8.3	11.8	6.1	21.6	11.6	13.0
Deerlodge	0	0	0	0	3.3	4.5	3.4	0	0	3.6
Flathead	12.0	11.0	9.1	9.5	6.6	12.2	4.8	17.0	0	9.7
Granite	0	5.0	7.6	0	5.5	5.5	3.8	0	0	5.2
Lake	11.8	6.7	7.8	0	4.3	7.9	4.0	9.3	0	7.6
Lewis&Clark	0	6.6	0	0	4.8	7.3	3.9	0	0	5.5
Lincoln	16.3	9.8	9.1	9.0	7.0	14.6	5.0	14.2	10.8	10.4
Mineral	10.1	6.1	7.0	0	5.4	12.7	4.8	13.5	7.6	6.7
Missoula	13.0	6.4	7.6	0	5.7	7.9	4.9	8.7	0	7.0
Powell	0	6.1	7.2	0	4.7	7.1	3.3	0	0	5.9
Ravalli	0	7.5	6.1	0	6.0	7.8	3.2	0	0	7.2
Sanders	13.8	8.0	7.5	12.5	6.6	15.4	11.0	13.3	8.3	8.2
Silverbow	0	0	0	0	4.0	0	3.1	0	0	3.3
W. Montana	13.9	7.8	8.5	11.0	5.6	11.6	4.6	13.1	9.7	8.5
Idaho & Montana	18.0	8.5	8.8	10.1	7.2	11.7	5.1	20.5	11.6	10.6

TABLE 3 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR NATIONAL FOREST LAND IN IDAHO AND MONTANA - 1900

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
W.White Pine	18.4	21.9	4.2	13.5	12.1	29.8
Ponderosa P	12.5	8.0	1.7	5.7	26.6	45.5

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
Larch-Douglas-Fir	20.7	28.5	6.2	9.7	15.0	19.9
Hemlock-White Fir	3.0	7.1	2.5	7.5	28.5	51.5
Douglas-Fir	39.4	17.3	5.7	12.9	17.6	7.1
Engelmann Spruce	11.9	11.2	2.5	10.3	23.0	41.2
Lodgepole P	31.9	44.5	6.8	9.4	4.0	3.5
W.Red Cedar	2.5	3.6	1.3	6.2	6.2	80.7
Cedar-White Fir	21.6	15.3	6.4	13.1	25.1	18.4
N. Idaho	21.1	22.2	4.6	11.3	15.0	25.8
W.White Pine	22.8	23.2	3.8	6.8	22.5	20.8
Ponderosa P	8.4	9.8	6.2	5.0	16.1	54.4
Larch-Douglas-Fir	18.2	19.1	5.9	7.3	18.2	31.3
Hemlock-White Fir	1.9	12.6	23.1	0	24.6	37.7
Douglas-Fir	4.8	22.8	8.5	23.5	33.4	6.9
Engelman Spruce	2.8	3.9	1.6	4.8	41.9	45.1
Lodgepole P	17.5	38.6	11.4	20.5	9.3	2.7
W.Red Cedar	11.4	10.6	0.7	9.6	5.8	61.8
Cedar-White Fir	8.6	17.6	27.3	6.9	10.2	29.5
W. Montana	14.6	23.7	7.6	12.6	18.0	23.4
Idaho & Montana	17.4	23.1	6.4	12.0	16.7	24.4

* Potential Old Growth minimum age using 1991 Region One draft definitions:

	PP,DF,L	LP	OTHER
W. Mont	171+	141+	181+
N. Ida	151+	121+	161+

CLIMATIC SECTIONS

The age structure presented in the Climatic Sections is generally based on information from the 1930's timber inventory. Only Forest Service lands were evaluated in this analysis because of the cutting activity on private land which distorted its age structure. Age classes were adjusted to represent 1900 conditions which generally would reflect stand conditions at the time of Euroamerican arrival.

An attempt was made to determine the percentage of stands that could have qualified as old growth. The Region One draft definitions were used to screen the data however factors such as tree size, tree number, and other stand

attributes could not be evaluated. The percentage figures therefore represent all potential acres and the actual area could have been significantly less.

Grass types are more difficult to describe. Not only were they subjected to heavy grazing pressure very early in the settlement period which has left few undisturbed sites for reference but they are naturally highly variable which makes it difficult to quantify vegetation structure. Information is presented by major cover types and where available more site specific information is included. Additional information will be added in subsequent drafts.

CLIMATIC SECTION 1 - PRIEST

The zone is primarily west of Region One with only a minor section found in northern Idaho. It lies west of Priest River and Priest Lake from Sandpoint to the Canadian line. It covers a portion of the Kaniksu and Kootenai Forests in Boundary and Bonner counties and includes a portion of the Purcell Mountains.

The climate is under the Pacific Maritime influence with precipitation ranging from 30 to 70 inches. A variety of landforms occur in the area with glacial activity evident in moraines and deposition areas. Granitic and belts slopes and rolling hills are also present. Winters are not particularly severe but snowfall is heavy. Adequate soil moisture is generally present during the growing season on all but the most severe sites.

The historical development for the portion in Montana followed that associated with Climatic Section 9.

Currently data is only available for the Idaho portion. Subsequent drafts will include the Washington portion. About 98 percent of the area supported forested communities with 60 percent of the area in the white pine type and 28 percent in the larch-Douglas-fir type. The remaining 10 percent was made up of minor amounts of the other cover types including lodgepole pine, ponderosa pine and spruce-fir types. Most of the area is Forest Service ownership and data from Climatic Section 8 probably will provide a good description of the age structure of the cover types encountered. Significant portions of the area were burned during 1926 and to a lessor extent in 1909.

CLIMATIC SECTION 2 - SPOKANE

Like area 1 this zone is more common in Washington and represents only a minor portion of Region One. It is primarily in non Forest Service ownership. The area lies south of Newport to the Purcell Trench and along the west side of Lake Coeur d'Alene to Hangman Creek and includes a portion of Bonner, Kootenai and Benewah Counties.

Climatic conditions represent a transition from the Palouse grasslands in Washington to the forested types in Idaho. Precipitation varies from 20 inches in some of the major valleys to about 60 inches on the higher points. Temperatures are somewhat warmer than Section 1. The mountain slopes are formed from the Belt rock group with the major valleys filled with glacial deposition.

The historical development for the portion in Montana followed that associated with Climatic Section 8.

In Idaho forested cover types occupy about 78 percent of the Section. Ponderosa pine was the major cover type (59 percent) with larch-Douglas-fir found on 11 percent and white pine and a minor amount of lodgepole pine on the remaining 8 percent. Climatic Section 8 provides an approximation of the historical stand structure. Specific cover type information for the portion of the type in Washington will be included in subsequent drafts.

The non forest portion represents 22 percent of the area and was dominated by the wheatgrass-fescue cover type. It was primarily a dense, low to medium tall grassland with bluebunch wheatgrass and Idaho fescue the dominant species. A number of common forbs such as yarrow, paintbrush, lupine, hawkweed and cinquefoil were present. Three tipped sagebrush was the most common shrub with rose and snowberry also present.

CLIMATIC SECTION 3 - PALUSE

This climatic type occupies a small area north of the Clearwater River, south of the Palouse Range and the area around Potlach. Only a minor amount of Forest Service land is found in the unit. The area is predominately found in Latah County with only a minor amount in Nez Perce county. The Section extends into Washington however information has not been analyzed for this portion to date.

The area is significantly drier and warmer than Climatic Section 8 and the Palouse grassland occupeies a majority of the Section. Precipitation averages about 20 to 30 inches per year. The topography is one of rolling hills and stream breaklands on basalt.

The area around Moscow was settled about 1871 with a sawmill established in 1876. Small sawmills were common with 13 present in 1910. The large mill at Potlach was started in 1906 resulting in major impacts on the forested communities.

Forested Types (30 percent)

Ponderosa pine - About 29 percent of the Climatic Area contained ponderosa pine. Using County figures for 1938 about 38 percent was shown as sawtimber, 48 percent as poles and 12 percent as seedling and sapling. The remaining 2 percent was recent burns and cutover areas. About 51 percent may have been old growth and 2 percent was under 40 years of age in 1900. These values were based on Forest Service land in Latah county which is generally in Climatic Section 8.

Minor amounts of other types accounted for about 1 percent of the area with larch-Douglas-fir the most common type. Riparian areas contained minor amounts of moist cover types such as Engelmann spruce.

Grassland Types (70 percent)

Wheatgrass-fescue - Over 70 percent of the Climatic Section was in grass types. This was a dense, low to medium tall grassland with bluebunch wheatgrass and Idaho fescue the dominant species. A number of common forbs such as yarrow, paintbrush, lupine, hawkweed and cinquefoil were present.

Three tipped sagebrush was the most common shrub with rose and snowberry also present.

Specific age structure information is currently not available for the major portion of the type in Washington, however, Climatic Section 8 provides an approximation of the historical stand structure on the forested acres for Idaho.

CLIMATIC SECTION 4 - SNAKE-SALMON

A small area west of Grangeville to Riggins and the south slopes into the Salmon river to Waugh Mountain on the Nez Perce Forest is designated Climatic Section 4. About one third of the area is Forest Service land principally along the Salmon River and includes portions of the Nez Perce and Bitterroot Forests. The area is primarily in Idaho County with only a minor amount of Nez Perce and Lewis County included. The Section extends into Washington and Oregon but information is currently not avaliable for this portion of the area.

The area is significantly drier and warmer than Climatic Section 8 and a significant portion is covered by the Palouse grassland or open grown ponderosa pine stands. Precipitation ranges from 10 to 40 inches a year. Landforms are primarily breaklands in a variety of bedrock with a minor amount of basalt uplands on a slightly cooler and moister environment.

Settlement in the Grangeville area began about 1861 but was limited until about 1900. A few small sawmills were present to provide lumber for local construction.

Forested Types (47 percent)

Ponderosa pine - This type accounted for about 33 percent of the Climatic Section. County figures on stand structure may be misleading for this area because of the large and diverse nature of Idaho County and logging on private lands in the other two counties. Mature and old growth stands probably accounted for between 39 and 80 percent of the stands and stands less than 40 years of age accounted for between 13 and 34 percent. These stands would have been open grown essentially pure ponderosa pine.

Other forest types - The remaining forested portion of the area included a mixture of types and accounted for about 14 percent of the unit. Lodgepole pine (5 percent), subalpine (8 percent) and larch-Douglas-fir (1 percent) types were the most common. Minor amounts of riparian cover types would have been found associated with major drainages. Stand structure for these types was similar to Climatic Section 6.

Grassland Types (53 percent)

Wheatgrass-bluegrasse - Primarily a dense, low to medium tall grassland dominated by bluebunch wheatgrass with Sandburg bluegrass an important secondary species. It is considered a moderately arid grassland. A number of common forbs such as yarrow, milkvetch, and lupine were present. Rabbitbrush was the most common shrub.

CLIMATIC SECTION 5 - CAMAS PRAIRIE

This climatic type occupies the area between Grangeville, Lewiston, Orofino and Kamiah in Lewis, Idaho and Nez Perce Counties. A minor amount of the Nez Perce Forest is found in the unit south of Grangeville and most of the Nez Perce Indian Reservation are included.

The area is very similar to Climatic Section 3 and is dominated by the Palouse grassland. Ponderosa pine and possibly some of the other types found along riparian zones represent the forest cover types. Precipitation ranges from 20 to 30 inches per year and landforms are palouse steppe or rolling uplands over basalt with a minor amount of dissected basalt uplands.

While settlement in the Grangeville area began about 1861 the majority of the area is in the Nez Perce Indian Reservation which was not opened to settlement until 1895. This led to rapid development and by 1900 there was an increase of about 10,000 people over the 1890 census. Between 1898 and 1905 numerous small mills were started to supply local needs. In 1910 a large mill was built in Winchester and lumber was sawn for export.

Forested Types (37 percent)

Ponderosa pine - This type accounts for about 31 percent of the cover type for the unit. County figures describing stand structure may be misleading for this area because of the large amount of cutting on private lands between 1910 and 1930. Mature and old growth stands probably accounted for between 44 and 58 percent of the stands while stands less than 40 years accounted for between 8 and 34 percent. These stands would have been open grown essentially pure ponderosa pine.

Other forest types - The remaining forested portion of the area included a mixture of types and accounted for about 6 percent of the unit. Douglas-fir (4 percent) and larch-Douglas-fir (2 percent) cover types were the most common. Minor amounts of riparian types would have been found associated with major drainages.

Stand structure for these types would have been similar to Climatic Section 6.

Grassland Types (63 percent)

Wheatgrass-fescue - Two variations of the wheatgrass type were found in the area. The area around Lewiston and Craigmont had significant amounts of sandberg bluegrass associated with it. It occupied about half of the grassland type in the Climatic Section. Conditions are similar to those described in Climatic Section 4. The remaining area was dominated by wheatgrass-fescue and was slightly more mesic than the wheatgrass-bluegrass type. It is similar to the description in Climatic Section 3.

CLIMATIC SECTION 6 - CLEARWATER

This is an area between the Selway and Salmon Rivers in Idaho. Forests covered include most of the Nez Perce and the Magruder portion of the Bitterroot. It is entirely in Idaho county.

The area is under the influence of the maritime climate with precipitation ranging from 20 to 70 inches. Landforms are a mixture of breaklands and mountain slopes with granitic soils. A minor amount of the area was glaciated. Cover types had moderate to high percentages of young stands when compared to similar types in the other Climatic Sections. Conversely the number of old growth stands was low to moderate in comparison with the other Climatic Sections. This structure would indicate a higher than normal impact from fire than other parts of Idaho or western Montana.

Timber harvest started about 1863 in conjunction with mining activity at Elk City. Activity was intermittent until 1878 when a number of small mills were developed to provide lumber for local use. By 1924 there were 21 small plants in Idaho County, however, the production of sawlogs was greatly exceeded by fuelwood through this period. By the 1930's less than 1 percent of the Federal ownership had been logged.

Major Cover Types

Forested Types (96 percent)

Western white pine - The data suggests that about 2 percent of the area was covered with this type but it may be significantly less. The type shows a high level of disturbance with about 50 percent below 40 years of age and less than 10 percent in an old growth condition. Young stands were moderate to well stocked with only 15 percent shown as poor. This type reaches it southern limit along the north boundary of the unit.

Ponderosa pine - About 45 percent was old growth which is at the low end for the cover type and 18 percent was less than 40 years of age. Young stands were similar in stocking at all levels with 78 percent well and moderate and 22 percent listed as poorly stocked. The type represents about 13 percent of the land area.

Larch-Douglas-fir - The stands tended to be younger aged with 35 percent less than 40 years and 21 percent old growth which is lower than expected. Young stands tended to be well or moderately stocked however 27 percent were considered poorly stocked. This was a minor type representing about 5 percent of the land area.

Douglas-fir - Stands were dominated by younger aged conditions with 60 percent less than 40 years and only 7 percent old growth. About 50 percent of the stands were nonstocked indicating the slower recovery on these drier and warmer slopes as compared to the lodgepole cover type. This structure suggests a high level of disturbance as indicated in the other cover types. All levels of stocking were common with poor stocking having a slight edge (41 percent). The type was found on about 16 percent of the land area.

Lodgepole pine - This type contained the youngest stands with about 70 percent less than 40 years of age and 93 percent less than 100 years. About 27 percent was unstocked which along with the adjacent nonstocked Douglas-fir type would have left many of the upper slopes and ridgelines bare of tree growth. About 2 percent was old growth. Young stands were predominately well stocked (86 percent) with some moderately stocked (10 percent). The type was one of the most common types with about 20 percent of the land area occupied.

A group of types are lumped as spruce-fir on the vegetation maps and would have included the following types. In addition minor amounts of these types would have been found in the riparian areas or moist benches included in the other types which were too small to map separately. In total they accounted for about 13 percent of the land area.

Engelmann spruce - About 46 percent was under 40 years of age and 22 percent was old growth which is opposite what would normally be found in this type. Young stands were predominately poorly stocked (82 percent) with 16 percent moderately stocked. This structure seems to support a frequent fire sequence. Over 4 percent of the land area was occupied by this type.

Western hemlock-Grand fir - It was dominated by mature stands with 50 percent meeting old growth definition and only 6 percent less than 40 years of age. Young stands tended to be moderately to poorly stocked with only 18 percent considered well stocked. It accounted for about 4 percent of the land area.

Western redcedar - This is a minor type found along the larger drainages. About 21 percent were under 40 years of age and 59 percent considered old growth. Young stands were generally well stocked or moderately stocked with only 3 percent considered poorly stocked. This was a very limited type with only a trace present.

Western redcedar-Grand fir - Old Growth stands were limited with only 4 percent meeting the definition. About 42 percent were less than 40 years of age again indicating the influence of past fire activity. Young stands tended to be well stocked (47 percent) or moderately stocked (33 percent). It occupied about 4 percent of the land area.

Alpine - This type covered a major portion of Climatic Section 6 accounting for 20 percent of the area. The type was dominated by lodgepole pine, whitebark pine or mixtures of subalpine fir and spruce. Age data was not available for this type however about 4 percent was shown as burned and nonstocked. Stands tended to be open and somewhat variable in coverage.

Noncommercial Forest - This area represented sites that were steep and rocky and normally found at upper elevations. Data is not available on structure or composition of these sites. Around 3 percent of the land area was in this type.

Other - An additional 6 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforested Types (4 percent)

Grassland - Scattered through the area are a number of high energy slopes or soils with high water tables that were dominated by grass types. These were highly variable depending on local site conditions and ranged from the xeric bunchgrass types such as wheatgrass-fescue to wet sedge meadows. Just under 3 percent of the area was in this type.

Other - The remaining area which was less than one percent was occupied by barrens, shrub communities or areas under cultivation.

TABLE 4 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 6
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
W.White Pine	40.8	9.1	2.3	16.7	21.6	9.5
Ponderosa P	14.6	3.9	0.7	5.9	29.5	45.4
Larch-Douglas-Fir	15.7	19.7	3.2	12.6	28.0	20.8
Hemlock-White Fir	3.4	3.0	2.4	6.7	34.9	49.6
Douglas-Fir	49.7	10.5	4.9	8.6	18.9	7.4
Engelmann Spruce	43.2	2.6	2.1	8.5	21.3	22.3
Lodgepole P	27.0	42.6	10.3	13.1	4.7	2.3
W.Red Cedar	8.6	12.5	3.6	3.4	12.9	59.0
Cedar-White Fir	25.6	16.8	7.1	14.8	31.7	4.0
Avg for Climatic S.	27.3	13.8	4.2	10.0	23.5	21.2

CLIMATIC SECTION 7 - SEVEN DEVILS

This is a very small area in Hell's Canyon Wilderness area which is associated with a much larger area south of the Salmon River. It is located in Idaho County on the Nez Perce Forest.

Climatic conditions are generally warm with precipitation varying from 10 to 40 inches. Landforms consist of breaklands and ice scoured highlands on the Belt substrate.

Data is not presently available for the unit as most of it lies outside of Region One. Information from the adjacent area suggests that the warm dry lowlands were covered by the wheatgrass-fescue or the ponderosa pine cover types. They accounted for 29 and 40 percent of the land area respectively. Lodgepole pine (24 percent) and Douglas-fir (8 percent) were common on the uplands. Age structure was probably similar to Climatic Section 6.

CLIMATIC SECTION 8 - ST.JOE-LOCHSA

This is a large area occupying the central portion of North Idaho and a minor amount of Montana. Forests covered include all of the Coeur d' Alene, St. Joe, Clearwater and portions of the Nez Perce (Moose Creek Drainage), Lolo (west end), Kootenai (extreme south part) and Kaniksu (south of Pend Orille Lake). It covers all or part of Benewah, Bonner, Clearwater, Kootenai, Idaho, Latah and Shoshone counties in Idaho and parts of Mineral and Sanders Counties in Montana.

The area is dominated by the maritime climatic influence with precipitation ranging from 40 to 80 inches. Landform is variable and includes various mountain slopes, breaklands and ice scoured areas. Granitics, belts and argilites and other parent materials are present. Temperatures are considered cool on most sites except high energy south and west slopes. Cover types generally have moderate to high percentage of old growth and also a moderate to high amount of stands less than 40 years of age. This structure would suggest a higher than normal amount of stand replacement fire with a longer period free of damaging fires than found on the other Climatic Sections in Idaho.

Logging activity began at Pierce about 1861 and at Elk City and Florence about 1863 to provide lumber for the mining activity. Small mills began to appear in Idaho about 1878 to provide lumber for local use and by the 1890's mills were scattered throughout the area. It was not until 1900 however, that large mills were constructed that began to cut a significant amount of the mature stands. In Montana some logging occurred in the 1860's to support the mining activity near Superior. With the arrival of the railroad in the 1880's timber immediately adjacent to the right-of-way was heavily cut for construction and export to outside markets. By the 1930's about 9 percent of the Federal ownership had been logged in Idaho and about 12 percent in Montana.

Major Cover Types

Forested types (89 percent)

Western white pine - Stand structure tended to be somewhat evenly distributed among the age classes with about 41 percent less than 40 years of age and 27 percent old growth. About 51 percent of the young stands were well stocked and only 15 percent listed as poorly stocked. The type dominated the Climatic Section with over 31 percent of the land occupied by it.

Ponderosa pine - Stands were dominated by mature stands with 49 percent old growth. About 21 percent were less than 40 years of age. Young stands were similar in stocking at all levels with 78 percent well and moderate and 22 percent listed as poorly stocked for Idaho. About 13 percent of the area was in the ponderosa pine type.

Larch-Douglas-fir - The stands tended to be younger aged with 49 percent less than 40 years. About 20 percent were old growth which is somewhat lower than expected. Young stands tended to be well stocked however 24 percent were considered poorly stocked. Almost 11 percent of the area was in this type.

Douglas-fir - Stands tended to be younger aged with 55 percent less than 40 years and 7 percent old growth. These stands were similar to the lodgepole pine cover type showing a high level of disturbance. All levels of stocking were common in young stands with poor stocking having a slight edge. This type accounted for over 4 percent of the area.

Lodgepole pine - This type contained the youngest stands with about 77 percent less than 40 years of age and 93 percent less than 100 years. In addition about 34 percent was unstocked which would have left many of the upper ridgelines bare of tree growth. About 3 percent met the old growth definition. Young stands were largely well stocked (73 percent) with some moderately stocked (18 percent). About 7 percent of the area was occupied by this type.

Engelmann spruce - About 19 percent were under 40 years of age and 42 percent was old growth which is similar to the ponderosa pine type age structure. Contrary to what may be though, the young stands tended to be moderate to poor in stocking which could be a reflection of frequent underburning from fire originating in the adjacent uplands. Engelmann spruce was a minor type representing only a little over 1 percent.

Western hemlock-Grand fir - The type is characterized by mid age to overmature stands with about 45 percent old growth and 13 percent less than 40 years of age. This type had the same coverage as Engelmann spruce.

Western redcedar - Old growth stands are common in the western redcedar type (74 percent) with stands less than 40 years found on about 9 percent of the type. The type occurred in only trace amounts.

Western redcedar-grand fir - The western red cedar-grand fir type shows more disturbance with only 17 percent in old growth and 36 percent less than 40 years of age. Young stands are evenly divided among the three stocking classes. Less than 2 percent of the area was occupied by this type.

Cottonwood - A trace amount of cottonwood cover type was located along the major drainages through out the area. These commonly were confined to a narrow strip adjacent to the stream or on periodically flooded terraces. About 53 percent was classified as saw timber sized material and 47 percent pole sized. No seedling or sapling areas were indicated.

Alpine and noncommercial - About 12 percent of the Climatic Section was in this cover type. It generally represented the high subalpine type however rocky areas at all elevations were included. Cover types were various mixtures of lodgepole pine, whitebark pine, Engelmann spruce, and subalpine fir. Data is not available to describe stand or age structure. About 5 percent was described as nonstocked as the result of fire. Stands tended to be open and somewhat variable in coverage.

Other - An additional 7 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforested Types (11 percent)

Grassland - While some natural grasslands existed they accounted for only about 4 percent of the land area. These were made up of types similar to the wheatgrass-fescue type described in Climatic Section 3 and edaphic types which occurred as small inclusions in the general forest area. Vegetation composition was highly variable on the edaphic types ranging from the wheatgrass-fescue type to wet sedge meadows.

Other - A minor amount of the unit was typed as brush or barren (less than 1 percent) with the remaining area in cultivation or pasture which represented about 7 percent of the land area. It is most likely that much of this acreage was originally in the moist riparian types or grasslands and was found in the major valleys at low elevation.

TABLE 5 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 8
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
W.White Pine	18.4	22.2	4.5	14.5	13.7	26.7
Ponderosa P	12.6	8.5	4.2	5.8	19.5	49.4
Larch-Douglas-Fir	27.0	22.1	5.5	10.9	14.7	19.8
Hemlock-White Fir	2.9	9.7	2.4	7.5	32.5	45.0
Douglas-Fir	35.5	19.3	6.3	14.7	17.2	7.0
Engelmann spruce	13.7	5.7	2.5	12.3	23.6	42.2
Lodgepole P	33.6	43.1	6.8	9.2	4.0	3.3
W.Red Cedar	3.6	5.0	1.1	9.2	7.4	73.7
Cedar-White Fir	20.4	15.4	6.2	12.8	28.5	16.7
Avg for Climatic S.	21.8	21.8	5.0	12.0	14.9	24.5

CLIMATIC SECTION 9 PEND OREILLE

This area occupies the extreme northern portion of Idaho and the Purcell and Cabinet Mountains of Montana. Forests covered include most of the Kaniksu and the western portion of the Kootenai. It covers all of Boundary and part of Bonner counties in Idaho and part of Lincoln and Sanders counties in Montana.

The area is the center of the Inland Empire Region and central to the maritime climatic influence in Idaho. Precipitation ranges from 40 to 80 inches with adequate moisture for tree growth on all but the driest slopes. Winters are relatively mild with abundant snowfall. The entire unit has been impacted by continental glaciation. Mountain slopes and valley bottoms have glacial deposition with some of the high ridges and peaks impacted by ice scouring. Most of the area is in the Belt supergroup.

Logging began in this area after the arrival of the Great Northern Railway in 1892 and the large mills began activity about 1900. By the 1930's about 12 percent of the Federal ownership had been logged in Idaho with probably a similar amount in Montana.

Major Cover Types

Forested Types (93 percent)

Western white pine - Stand structure tended to be somewhat evenly distributed among the age classes with about 44 percent less than 40 years in age and 34 percent old growth. Young stands tended to be well stocked with 64 percent classified as such in the portion not cut. While not as common as found in Section 8, the white pine type accounted for almost 18 percent.

Ponderosa pine - Stands were dominated by mature age conditions with 57 percent considered old growth. Only about 19 percent were less than 40 years of age. About half of the young stands were considered poorly stocked and 36 percent moderately stocked in the Idaho portion. It was a fairly common type on about 15 percent of the unit.

Larch-Douglas-fir - The stands tended to be younger aged stands with 51 percent less than 40 years. About 25 percent were old growth which is lower than expected. Young stands tended to be well stocked however 31 percent were considered poorly stocked. This type appears to have been more variable than most of the types. It was the most common type in the Climatic Section representing 25 percent of the area.

Douglas-fir - Stands tended to be younger aged with 54 percent less than 40 years of age and 16 percent meeting old growth definition. All levels of stocking were common. Only 1 percent was in this type.

Lodgepole pine - About 76 percent of the stands were less than 40 years of age and 93 percent less than 100 years. In addition about 28 percent was unstocked. About 2 percent was old growth. Young stands were dominated by well stocked conditions (90 percent) and the cover type was found on about 8 percent of the area.

Engelmann Spruce - About 15 percent were under 40 years of age and 48 percent met the old growth definition which is similar to the ponderosa pine type age structure. Young stands tended to be moderate to poor in stocking which could be a reflection of frequent underburning from fire originating in the adjacent uplands. The type was confined to less than 4 percent of the area.

Riparian - The last group is composed of three minor cover types found in the lower elevation riparian zones and moist north slopes which in total did not make up one percent of the land area. Western hemlock-grand fir was a minor component on the warmer riparian sites or moist flats. Western red cedar cover type made up the bulk of the riparian zone. Western red cedar-grand fir was commonly found on north slopes and not necessarily in the riparian zone. The western red cedar type was typically dominated by old growth stands (86 percent) with stands less than 40 years found on only 4 percent of the type. The other two types were more uniform in age structure with between 50 and 55 percent meeting old growth definition and 14 to 19 percent less than 40 years of age. Young stands were typically well stocked (60 percent) however 26 percent were also found in a poor stocking condition. A minor amount of cottonwood cover type was associated with the major stream bottoms. They accounted for just over 1 percent of the area.

Alpine and noncommercial - This type found on 18 percent of the area was dominated by lodgepole pine, whitebark pine or mixtures of subalpine fir and spruce or rocky and steep slopes with limited tree cover. Age data was not available for this type however about 2 percent was shown as burned. Stands tended to be open and somewhat variable in coverage.

Other - An additional 4 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforest - The remaining area represented about 7 percent of the area and included grass, brush, barren (rock) and cultivated or stump pasture areas. No information was available on species composition of these sites.

TABLE 6 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 9
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
W.White Pine	19.8	24.7	3.3	5.2	12.6	34.3
Ponderosa P	7.8	11.3	6.2	5.4	12.7	56.5
Larch-Douglas-Fir	22.3	28.1	7.5	6.0	11.3	24.6
Hemlock-White Fir	2.3	17.0	0.0	0.0	25.4	55.1
Douglas-Fir	12.9	41.0	4.0	9.9	16.3	15.9
Engelmann spruce	2.4	12.4	1.8	5.7	29.7	47.9
Lodgepole P	28.4	47.6	12.5	4.8	4.4	2.3
W.Red Cedar	2.0	1.7	1.0	4.1	5.3	85.9
Cedar-White Fir	5.7	8.0	17.2	3.1	15.6	50.2
Avg for Climatic S.	19.3	27.4	6.7	5.6	12.0	29.0

CLIMATIC SECTION 10 - LOWER FLATHEAD

This area includes most of the Flathead Indian Reservation, and includes Flathead Lake north westerly to Columbia Falls and Eureka and from Plains to Libby to the Canadian boundary. It covers portions of Lincoln, Flathead, Sanders, Mineral and Lake Counties. Portions of the Kootenai, Flathead and Lolo Forests are included.

While the area is dominated by the maritime climatic influence it is subject to intrusions of cold arctic air in the winter. As a result Climatic Section 10 is cooler than area 9 and species such as western hemlock are found only on cove or sheltered areas. Precipitation ranges from a low of about 18 inches in the valley bottom to a high of over 100 inches on the Continental Divide. Moisture is adequate for tree growth on all but the driest sites in the major valley bottoms. While winters are still relatively mild, occasional blasts of cold arctic air can cause frost damage on the more sensitive species associated with the maritime belt. Glacial deposition dominates both valley bottoms and mountain slopes over most of the area. Some of the steeper slopes along the Continental Divide are on belt rocks which show ice scouring.

Major vegetative impacts probably began with the arrival of the Great Northern Railroad in the 1890's. This event plus the demand for wood products in the Great Falls area to support the smelting industry caused rapid change. By the time the timber inventory was conducted in the mid 1930's about 16 percent of the Climatic Section was harvested. The majority of this cutting occurred on private lands in the major valley bottoms where 19 percent of the ponderosa pine type was harvested. About 14 percent of the white pine stands had been

entered and 13 percent of the other forest types. Approximately 7 percent of the Forest Service ownership was harvested

Major Cover Types

Forested Types (84 percent)

Western white pine - Stand structure was more or less equally divided among the age classes with about 48 percent less than 40 years in age and 22 percent meeting the old growth definition. This distribution is typical for western Montana. The type reaches its eastern boundary in the area and only covers about 5 percent of the land area.

Ponderosa pine - Stands tended to be mature with about 53 percent in the old growth category and 19 percent less than 40 years of age which is typical for western Montana. Approximately 19 percent of the Climatic Section contained ponderosa pine cover type.

Larch-Douglas-fir - The stands tended to be evenly distributed over the various age classes with 39 percent less than 40 years. About 30 percent met the old growth definition. Stand conditions were typical of western Montana and the type was found on 27 percent of the area. This type was the most common cover type found in Climatic Section 10.

Douglas-fir - This type was commonly found on cooler and drier sites often at mid slope. Stands were dominated by mid aged conditions with 22 percent less than 40 years and 16 percent old growth. These conditions indicated a more mature cover type than normally found over the remainder of western Montana. The type covered about 1 percent of the area.

Lodgepole Pine - About 91 percent was less than 100 years of age and 70 percent less than 40 years of which about 27 percent was unstocked. A little less than 3 percent was old growth. While the percent of old growth was similar to the average for western Montana there was significantly more area in stands less than 40 years of age. The area nonstocked also was about 10 percent higher than the average. This was an important type covering about 9 percent of the area.

Engelmann Spruce - About 8 percent was under 40 years of age and 48 percent met the old growth definition which is the average for the Climatic Section. While the inventory suggested the type only represented 3 percent of the area, major areas are shown on the Regional vegetation map. Because of the mixed composition of stands in this Climatic Section some of these mapped sites were likely inventoried as larch-Douglas-fir types.

Riparian Area Cover Types

Western hemlock-Grand fir - It was dominated by mature stands with 51 percent meeting old growth and 12 percent less than 40 years of age. Western hemlock is found only on protected sites within the area and represented only a trace in coverage.

Western red cedar - This is a minor type found along the larger drainages. About 19 percent were under 40 years of age and 65 percent considered old growth. This type also was found only in trace amounts.

Western red cedar-grand fir - Age structure was more or less evenly distributed with old growth stands occupying about 33 percent of the area and about 24 percent less than 40 years of age.

These three cover types plus the cottonwood type are not mapped on the Regional vegetation map because of the their limited coverage. While minor amounts of cedar may be mixed in with other cover types only narrow stringers along the drainages supported enough cedar to type as a cover type. The cottonwood type found along the major valleys were the most common riparian type. About half of the area was classed as sawtimber with the remaining shown as seedling, sapling or poles. The combined area of the four types was less than 1 percent.

Alpine and noncommercial - These types covered about 17 percent of the area. The area was dominated by lodgepole pine, whitebark pine or mixtures of subalpine fir and spruce. Age data was not available for this type however about 17 percent of the Forest Service area was shown as burned. It is most likely that much of this burn was a result of the 1910 fire season however portions may represent the 1889 season.

Other - An additional 3 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforested Types (16 percent)

The remaining area was composed of a mixture of various vegetation types and represents about 16 percent of the area. Areas typed as rock or barren, brush or grass or cultivated areas made up this type. About 5 percent of it may have been in a grass type. The grass community was composed principally of the wheatgrass-fescue type and was found primarily southwest of Flathead Lake plus other dry exposures. Vegetative composition on the drier sites was dominated by bluebunch wheatgrass, rough fescue and neddleandthread. On moister sites rough fescue was the dominant species along with Idaho fescue and bluebunch wheatgrass. Big sagebrush was the major shrub on both conditions. These two types were equally represented in the area.

TABLE 7 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 10
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 141+*YRS
W.White Pine	24.8	23.5	3.4	6.0	19.9	22.4
Ponderosa P	9.4	9.6	8.3	7.2	12.2	53.3
Larch-Douglas-Fir	16.7	22.4	6.9	7.2	17.2	29.6
Hemlock-White Fir	1.6	10.7	9.8	0.0	26.8	51.1
Douglas-Fir	7.2	14.6	4.6	13.8	43.5	16.3
Engelmann spruce	3.0	4.5	1.2	3.6	39.7	48.0
Lodgepole P	27.6	42.2	13.7	7.3	6.6	2.9
W.Red Cedar	11.0	8.1	0.8	9.1	6.2	64.8
Cedar-White Fir	10.4	13.8	30.2	2.3	10.4	32.9
Avg for Climatic S.	17.8	24.4	8.1	7.0	16.5	26.2

CLIMATIC SECTION 11 BITTERROOT-BLACKFOOT

This area represents a transition zone between the Pacific Maritime zone of northwest Montana and northern Idaho and the Continental climatic zone east of the Continental Divide. It includes all of Ravalli and portions of Missoula, Mineral, Sanders, Lake, Flathead, Granite, Powell and Lewis and Clark Counties. The area in Lake and Sanders Counties is all part of the Flathead Indian Reservation. Portions of the Bitterroot, Lolo, Flathead and Helena Forests are included.

Precipitation ranged from over 80 inches on the Bitterroot Divide to less than 14 inches in the valleys. Climatic conditions are cooler and drier than Section 10 and other than western hemlock all species associated with the Pacific Coast forest reach their southeastern limits within the unit. Over much of the area these species are restricted to moist environments such as the canyon bottoms along the Bitterroot Mountains. Significant acreages of grass types are found on the drier sites at low elevations east of the Bitterroot River. The preponderance of the soils are associated with the Belts or areas impacted by alpine glaciation. Major valleys contain glacial deposits and high ridglines have been subjected to glacial scouring. While glacial activity is present it did not impact the landscape to the same degree as in Section 10 and as a result slopes tend to be steeper with narrow valley bottoms.

Some of the earliest settlement in the state occurred in this Climatic Section in the 1840's, however, it wasn't until the arrival of the railroad and development of the mining operation in Butte and Anaconda in the 1880's that there was any significant impact on the forest structure. By the 1890's major portions of the Clark Fork and Bitterroot Valleys had been logged and by the 1930's almost 22 percent of the area was logged. This included 40 percent of the ponderosa pine cover type, 17 percent of the white pine type and 14 percent of other types. About 14 percent of the Forest Service holding were effected. Other than the area immediately adjacent to Butte this unit experienced some of

the earliest impact from man's activities particularly in the ponderosa pine cover type.

Major Cover Types

Forested Types (82 percent)

Western white pine - Only trace amounts of this cover type are found in the unit as it reaches its climatic limits. Stand structure tends to concentrated in the mature class with about 21 percent less than 40 years in age and 22 percent old growth which is typical for the type.

Ponderosa pine - Stands tended to be mature with about 60 percent in an old growth condition and 16 percent less than 40 years of age. The amount of old growth is somewhat higher than the average for western Montana and probably reflects the drier environment where light underburning would be more prevalent. This was one of the major components of this Climatic Section representing about 17 percent of the land area.

Larch-Douglas-fir - While still an important component representing about 10 percent of the area this type reaches its southeastern limits within the Climatic Section. The stands tended to be evenly distributed over the various age classes with 30 percent less than 40 years and 35 percent old growth. This represents a slightly older structure than the average for western Montana again representing the drier conditions and more opportunity for light underburns.

Douglas-fir - Because much of the Climatic Section is outside the natural range of larch the pure Douglas-fir cover type becomes more important representing about 9 percent of the area. Stands were generally dominated by mid aged conditions with 22 percent less than 40 years and 7 percent old growth. While the old growth component is typical for western Montana the younger aged stands are significantly less. This may represent a lessor impact from the 1889 and 1910 fire years in this area.

Lodgepole Pine - The lodgepole pine cover type occupies slightly less area than ponderosa pine (13 percent) increasing in amount toward the south end of the Climatic Section. On 61 percent of the area lodgepole was less than 40 years of age and 92 percent less than 100 years which is less than the average for western Montana; however, less than 1 percent was old growth which is half of the average for western Montana. Leiberg's work suggests that about 80 percent was less than 40 years of age in 1880's which would generally agree with the above considering the different time periods. Older stands seemed to be more prevalent at the southern end of the Climatic Section.

Engelmann Spruce - This type becomes less important compared to Climatic Section 10 and 12 occupying about 1 percent of the area. About 6 percent were under 40 years of age and 51 percent were old growth which is about the average for western Montana. Much of the type was found in high elevation basins and was typed as alpine type during the timber inventory therefore the Regional vegetation map shows more area for the type. Under these conditions stands may have been older and the structure for the group may be biased by the lower elevation stands.

Riparian Area Cover Types

Western hemlock-Grand fir, Western red cedar, Western red cedar-grand fir - Because of the limited acreage that these three types represent in the area they have been treated as one. Stands typically are found in riparian areas or moist benches primarily west of the Clark Fork and Bitterroot Rivers. Stands tend to be mature with 50 percent meeting the old growth definition. Only 17 percent were less than 40 years of age. These types are found only in trace amounts. Adjacent to the Bitterroot and Clark Fork Rivers is found a narrow band of cottonwood type which is also limited in area. About 80 percent of these stands were seedling, sapling or pole sized with the remaining 20 percent considered sawtimber sized. The sum of these four types is less than 1 percent of the land area.

Alpine and noncommercial forest - This type covered about 30 percent of the area and was particularly important along the Bitterroot Mountains. The area was dominated by lodgepole pine, whitebark pine, alpine larch or mixtures of subalpine fir and spruce. Age data was not available for this type however present stand structure suggests that well stocked mature to old growth spruce basins were present. These were surrounded by stands of lodgepole or other species of various ages.

Other - An additional 2 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforested Types (18 percent)

Other - The remaining area was composed of a mixture of brush, grass, barren or cultivated types and represented about 18 percent of the area. About 15 percent of these types would have been in the wheatgrass-fescue cover type. The drier types east of the Bitterroot River to near Sleeping Child Creek were dominated by bluebunch wheatgrass and rough fescue along with varying amounts of needleandthread, junegrass, needlegrass and basin wildrye. In the upper valley and west of the river where moisture was more abundant rough fescue was the dominant species along with Idaho fescue and bluebunch wheatgrass. Big sagebrush was probably a scattered shrub on both sites along with a variety of forbs such as yarrow and native legumes.

TABLE 8 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 11
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 141+*YRS
W.White Pine	10.0	2.3	2.5	14.0	45.9	25.3
Ponderosa P	7.8	9.4	4.3	3.4	18.7	56.4
Larch-Douglas-Fir	14.4	16.6	7.1	9.2	20.2	32.5
Hemlock-White Fir	0.0	0.0	93.3	0.0	1.1	5.6
Douglas-Fir	3.6	19.7	7.9	29.2	32.2	7.4
Engelmann spruce	0.4	2.2	2.1	13.4	50.0	31.9
Lodgepole P	10.7	37.0	10.9	30.6	7.9	2.9
W.Red Cedar	20.5	45.2	0.0	22.3	0.6	11.4
Cedar-White Fir	5.5	7.9	13.4	28.6	14.7	29.9
Avg for Climatic S.	9.1	22.7	8.0	19.9	18.4	21.9

CLIMATIC SECTION 12 UPPER FLATHEAD

Included is the area east of Flathead Lake to the Continental Divide from the Canadian boundary south to the Swan River-Clearwater River Divide. It includes portions of Flathead, Lake, Missoula and a minor portion of Powell Counties. Portions of the Flathead and Lolo National Forests and the western part of Glacier Park are included.

Climatic conditions are similar to Climatic Section 9 however while white pine stands dominate Section 9, western larch is the major cover type in Section 12. Occasional movements of arctic air can also invade the area during the winter months resulting in death or frost damage to the sensitive species associated with the maritime climate. As a result these species are confined to protected areas or sites influenced by Flathead Lake. Precipitation ranges from 16 inches along Flathead Lake to more than 100 inches on the Continental Divide. The Swan Valley averages about 30 inches. The entire area has been impacted by continental or alpine glaciation with the valleys composed of glacial deposition. Most areas are underlain with belt or carbonate rock shaped by glacial activity. Slopes are moderate to steep with some mountains of glacial material being low to moderate in steepness.

The arrival of the Great Northern Railway in 1892 had the most impact on the forested areas particularly adjacent to the right-of-way. By the 1930's almost 19 percent of the Climatic Section had been logged. About 31 percent of the ponderosa pine cover type had been entered and 16 percent of the other types which would have largely represented the larch communities. Nine percent of the white pine had also been entered. Of the Forest Service ownership over 5 percent had been harvested during the same time period.

Major Cover Types

Forested Types (96 percent)

Western white pine - Stands tended to be concentrated in the mature class with about 21 percent less than 40 years in age and 22 percent old growth which is typical for western Montana. The type reaches its most eastern extension and is not well represented making up only about 2 percent of the coverage.

Ponderosa pine - Found on 2 percent of the Climatic Section the type is not as important as on the drier portions of Sections 10 and 11. Because of the moister conditions larch is commonly found in the large valley bottoms occupied by ponderosa pine elsewhere. Stands tended to be mature with about 60 percent in old growth and 16 percent were less than 40 years of age which represents slightly older conditions than average.

Larch-Douglas-fir - This type is the major cover type in Climatic Section 12 covering about 24 percent of the area. Stands tended to be evenly distributed over the various age classes with 30 percent less than 40 years. About 35 percent met the old growth definition. These percentages are slightly older than average for western Montana and may be the result of more open grown stand conditions in the valley floors which permitted more underburning conditions.

Douglas-fir - Stands were dominated by mid aged conditions with 22 percent less than 40 years and 7 percent old growth. The type is only a minor component representing about 2 percent of the area.

Lodgepole pine - The second most important cover type was the lodgepole pine type occupying about 20 percent of the area. About 61 percent was less than 40 years of age and 92 percent less than 100 years. Less than 1 percent was in old growth. These age conditions were younger than the average for western Montana and probably represent the influence of the better growing conditions which permitted more biomass accumulation and subsequently more severe and frequent fires. Early observations by investigators such as Ayres suggest that the coverage of the larch and lodgepole types may have fluctuated significantly over time based in large part on the severity of the last fire and the cone crop of western larch.

Engelmann Spruce - The Engelmann spruce type is found on a significant portion of the area in broad riparian areas or moist benches and represents about 8 percent of the land area. About 6 percent of the type was under 40 years of age and 51 percent old growth which represents slightly more old growth than the average for western Montana.

Riparian Cover Types - Only a trace of these cover types were found and they are typically not mapped because of their limited size. Western hemlock-Grand fir, Western red cedar, Western red cedar-grand fir are typically found in riparian areas or moist benches. Stands tend to be mature with 50 percent meeting the old growth definition. Only 17 percent were less than 40 years of age. In addition, minor amount of cottonwood cover type were found in the major valleys with 69 percent shown as sawtimber and 31 percent other age classes in the 1930's.

Alpine and Noncommercial Forest - These types cover the largest portion of Climatic Section 12 and were found on about 35 percent of the area. Age data is not available for this type nor information on species composition.

Lodgepole pine, whitebark pine and Engelmann spruce did represent major species within the zone along with lessor amounts of subalpine fir and alpine larch.

Other - An additional 4 percent was listed as old burns however the cover type was not indicated. These areas were probably associated with sites that were marginal for tree growth as a result of limited soil or moisture holding capability.

Nonforested Types (4 percent)

The remaining 4 percent of the land area was occupied by nonforest vegetation with the grass types representing less than one percent of the area. Much of this type would have been found in the major valleys and the high elevations along the Continental Divide. Grass communities in the valley bottoms would have been similar to those found in Section 10. Many of the high elevation sites are moist environments and are dominated by hairgrass or sedges. Other species that may be present are oatgrass, alpine timothy, bentgrass or rushes. The remaining area was composed of rock covering about 3 percent and shrubs particularly in avalanche chutes covering the remaining 1 percent of the area.

TABLE 9 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 12
Forest Service Acres Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
W.White Pine	11.7	9.7	1.2	4.6	51.0	21.8
Ponderosa P	3.5	12.5	6.2	5.0	10.0	62.8
Larch-Douglas-Fir	11.4	18.8	5.6	9.8	17.8	36.6
Hemlock-White Fir	0.0	0.0	64.5	0.0	10.7	24.8
Douglas-Fir	2.1	19.8	10.0	21.5	38.7	7.9
Engelmann spruce	1.9	4.2	4.8	3.5	28.6	57.0
Lodgepole P	18.2	43.0	12.4	18.2	7.4	0.8
W.Red Cedar	7.4	11.9	0.5	6.2	5.6	68.4
Cedar-White Fir	12.0	9.2	31.3	0.5	10.9	36.1
Avg for Climatic S.	10.5	21.6	7.2	10.6	18.0	32.1

CLIMATIC SECTION 13 - BEAVERHEAD-JEFFERSON

The southwestern corner of Montana is identified as Climatic Section 13 and includes the area west of the Madison Range and south of the Continental Divide to the state line. It includes portions or all of the Madison, Gravelly, Pioneer, and Bitterroot Mountain ranges. Portions of the Deerlodge, Beaverhead and Gallatin Forests are included. Counties covered are the Beaverhead, Madison, Gallatin, Broadwater, Jefferson, Powell, Granite, Deerlodge and Silverbow.

This Climatic Section is under the continental climate influence with cold winters and relatively dry growing conditions. The area is beyond the climatic limits of the Pacific coast species resulting in a limited number of tree species. Limber pine however is added to the list. Forest types cover about 33 percent of the zone with grass types found in the major valleys and throughout the forest region. Precipitation ranges from 50 inches on the highest points to 10 inches in the valleys. On some exposures sufficient moisture is not available before timberline conditions are encountered and grassland extend from the valley floor to the top of the mountain.

While not the earliest area settled in Montana, major vegetation changes occurred by the 1870's as a result of cattle grazing and logging in support of mining activities. By 1880 the easily accessible timber to the Butte area was gone which required extensive construction of flumes, tram ways and railroads to provide the wood necessary for mining activity. For example the smelter in Anaconda alone required 700 cords a day in the 1890's. By the 1930's data for the northwestern portion of the Climatic Section indicated that about 37 percent of the forests had been cut and Deerlodge county was in excess of 90 percent harvested. About 22 percent of the Forest Service ownership had been logged during the same time period. This pattern probably was common on all lands within 50 miles of Butte and Anaconda. Only survey level inventory information is available for the area east of the Continental Divide. Here, however, harvesting would have been limited to local use except near mining centers such as Bannack or Virginia City.

Limited historic surveys have been found for this area to date. Results of extensive surveys conducted in the 1940's indicated that 67 percent of the area was in commercial forest of which all but 1 percent was conifer. The remaining 7 percent of the area was non commercial forest. Stand structure in the 1940's was 22 percent sawtimber, 64 percent poles, 6 percent seedling and sapling and 6 percent poorly stocked or nonstocked. Cover type information was not available for the entire area however the volume of the various species does provide a clue to stand structure.

SPECIES	PERCENT BDFT	PERCENT CUFT
PP	3.8	2.7
L	T	T
DF	45.3	31.8
AF	1.6	2.3
ES	16.5	8.1
LP	29.5	51.0
WBP	2.6	2.6
ASPEN-COTTONWOOD	0.7	1.5

Board foot volumes averaged about 8.6 mbf for sawtimber stands and 1.6 mbf for pole stands. Some general conclusions have been developed from studies of the present stand age structure.

Forested Types (42 percent)

Douglas-fir - This type was found on foot slopes to the valleys and steep south and west facing slopes. Many of these sites were open grown or a savanna with large, old Douglas-fir. Stands could contain 5 or more age classes. The type was also found on north and east slopes. Here stands tended to be younger and

more dense. Age structure was more uniform. For the northwestern portion of the Climatic Section, 38 percent of the stands were less than 40 years of age and about 2 percent met old growth conditions. The type probably occupied about 11 percent of the area.

Engelmann spruce - This was a minor type covering about 1 percent of the area. It was found on the moister environments where subalpine fir was commonly found in mixture with it. Age structure for the northwestern portion indicated about 12 percent was less than 40 years of age and about 4 percent was potentially old growth.

Lodgepole pine - The cover type occupied the majority of the forested area covering about 26 percent of the Climatic Section. Old growth stands appeared to have been more common in the type with about 4 percent meeting the age criteria in the northwestern portion of the area. Stands that were 200 to 300 years of age in 1900 are still commonly found scattered over the area. Stand densities ranged from open grown conditions common on high elevation ridges or gentle slopes to dog hair thickets. Old growth stands were normally associated with the more gentle terrain. Only about 40 percent of the type was less than 40 years of age based on data for the northwestern portion. This would represent one of the lowest percentages found in the type across the Region.

Alpine and non commercial forest - This type was estimated to cover 5 percent of the section however information is not available to describe stand conditions.

Nonforested Types (58 percent)

Grassland - The dominant vegetation over 58 percent of the area was grassland. Two major types are recognized.

Wheatgrass-fescue - In this Climatic Section the type was generally an open to fairly dense grassland found in the valley bottoms or dry slopes. Major species were bluebunch wheatgrass, rough fescue, and needleandthread. Other species would have included yarrow, bluestem wheatgrass, sedge, wild buckwheat, prairie junegrass and pentstemon. This type was more common on the mid to northern portion of the area. On areas of shallow soil rough fescue become less important and prairie junegrass and needleandthread increased.

Sagebrush-grass - The southern and western portion of the area was occupied by this type. The vegetative structure was a dense to open grassland with a variable shrub component. The density of the shrub portion was primarily dependent on the length of time since the last fire. Dominant species included bluebunch wheatgrass and big sagebrush. Other components included other species of sagebrush, balsamroot, Idaho fescue, gromwell, lupine, ricegrass, phlox, bluegrass, bitterbrush and squirreltail.

Other types - In addition to the two types shown on the map there are some minor inclusions of other grass types which are not mapped. On high elevation sites are found alpine meadows which are dominated by bentgrass, sedges, hairgrass, fescue, woodrush, mountain timothy, bluegrass and spike trisetum. These sites vary from dense to very open with extensive barren areas. Forbs are also an important component of this type. At the other elevational extreme are sites in the valley bottoms that are subirrigated. A variety of species

are commonly found here including tall reedgrasses, tufted hairgrass, American mannagrass, tall sedges, wheatgrasses, basin wildrye, willows, shrubby cinquefoil and numerous forbs. The Bighole valley represents a major expression of this type. Saline areas along the Bighole River were dominated by basin wildrye, alkali sacaton and nuttall alkaligrass. Greasewood and silver buffaloberry were common shrubs.

TABLE 10 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 13
Forest Service Acres** Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 141+*YRS
Ponderosa P	2.3	9.1	1.0	4.1	60.4	23.1
Larch-Douglas-Fir	14.7	16.2	27.9	9.6	27.1	4.5
Douglas-Fir	5.2	33.0	13.1	19.8	27.0	1.9
Engelmann spruce	4.1	8.3	3.7	20.3	59.2	4.4
Lodgepole P	5.3	35.5	7.5	33.4	17.2	1.1
Avg for Climatic S.	5.2	33.5	8.6	28.8	21.8	2.1

** This table represents only the northeast corner of the Climatic Section west of the Continental Divide. Priliminary analysis of fire history studies conducted on the Beaverhead Forest suggest that the lodgepole pine cover type may have been significantly older than found anywhere in the Region.

CLIMATIC SECTION 14 - YELLOWSTONE

The northern portion of Yellowstone Park and the area north of it to the Crazy Mountains is included in Climatic Section 14. It covers portions of the Galatin, Helena, Lewis and Clark, and Custer Forests and Yellowstone Park in Montana. Portions of Madison, Gallatin, Park, Sweetgrass, Stillwater, Carbon, Wheatland, Golden Valley and Meagher Counties are included. The Crazy Mountains, Big Belt, and Absaroka Ranges are found in the area. The Beartooth Plateau which is located on the eastern portion of the Climatic Section contains one of the most extensive alpine areas in Montana. This Section extends into Wyoming however information is not yet available for this portion. Precipitation exceeds 80 inches a year in the high alpine areas. Most of the forested area however averages between 30 and 50 inches. Amounts drop dramatically to less than 14 inches in the grass types in the northeastern portion of the area. Parent material varies greatly over the area with volcanics, quartzites, argilites and sandstones most prevalent on the uplands. These sites have been impacted by glacial erosion and deposition resulting in areas of steep mountain slopes to rolling uplands. The foothills exhibit similar parent material with tertiary sediments resulting from fluvial deposition more common. Sites are primarily impacted by frost churning and slopes are moderate. The major valley bottoms represent deposition areas from fluvial and glacial activity plus areas of lake sediments.

Impacts on the forested vegetation were limited prior to 1900 and were concentrated in mining areas along the Gallatin and Yellowstone Rivers and the

Cooke City area. Cutting in Boulder and West Boulder Creeks occurred in the early 1880's with about 10 percent of the forested area in Area 14 harvested by 1904. The grasslands on the other hand experienced major impacts before 1900 as a result of cattle grazing in the 1880's.

Major Cover Types

Forested Types (27 percent)

Data from the 1940's timber inventory is limited to survey level information and does not provide much information on stand age and structure. The information on species composition is for all of southern Montana and because certain types are restricted in their location the data cannot be broken down by section. Survey work conducted in the early 1900's does provide some information about stand composition. This information is based on coverage of each species rather than cover type which may include a number of species. Consequently the information is not directly comparable to other Climatic Sections. Information is for Montana only and does not include the portion of the Climatic Section in Wyoming.

Forested Area - About 23 percent of the area contained typical forest communities. At the lower elevations stands were mixtures or pure stands of limber pine, minor amounts of ponderosa pine or Douglas-fir. On north slopes stands could be well stocked. On the remaining slopes, stands were generally open grown or savannas with trees being short and limby. Above 6,000 feet lodgepole pine was the major cover type and found in pure stands which were well stocked or mixed with Douglas-fir and Engelmann spruce. Douglas-fir was abundant on dry, rocky slopes while Engelmann spruce was common along the canyon bottoms, moist areas and in old growth lodgepole pine stands over 150 years of age. Above 7800 feet lodgepole stands were replaced by mixtures of white-bark pine, subalpine fir and Engelmann spruce. Engelmann spruce is the most abundant on the higher elevation sites followed by white-bark pine. Subalpine fir occurred most commonly in the lower portion of the subalpine area. It occurred in mixed stands and did not exceed 15 to 30 percent of the stand. Age structure varied greatly with stands 15 to 20 years of age associated with growths 75 to 100 years of age and with 200 to 300 year old stands. Of the forested area below 7800 feet, 10 percent was less than 50 years of age, 50 percent between 50 and 120 years with the remaining 40 percent between 120 to 300 years. Additionally 10 percent is shown as logged and 24 percent as burned. The logged area represents about 42,000 acres primarily on lower elevation slopes and is really part of the forested environment. The areas shown as burned are more than likely forested area that have burned during the last 35 to 40 years and represent about 138,000 acres. It was estimated that 70 percent of the forest had been burned over between 1780 and 1900. While some stands show an uneven age structure the majority are even aged suggesting stand replacement fires in the lodgepole type. Most lodgepole pine stands contained heavy accumulations of fuel and there was no indication that open, underburned sites were common.

Along the major rivers such as the Yellowstone was a zone of cottonwood forest. This type was principally made up of cottonwood with minor amounts of other hardwood species such as box elder and green ash. This mixture became more important in the eastern portion of Montana and on into the Dakotas.

Species composition listed below is for individual species and does not represent cover types as presented in previous Climatic Sections.

Douglas-fir	19 %
Lodgepole pine	50 %
Ponderosa pine	0.1%
Engelmann spruce	17 %
Subalpine fir	6 %
Limber pine	7 %
Aspen & cottonwood	0.6%

Woodland Type - This type occurred on the fringe of the forested area and represented shrubby open grown stands of limber pine, Douglas-fir, aspen or on occasion lodgepole pine. On moister environments these types represented the encroachment of the forested type unto grasslands and with the return of the next fire the site may revert to grassland. These sites were generally stocked with young aged stands. On drier sites particularly those stocked with limber pine or in some cases Douglas-fir, fire occurred as an underburn and the type was maintained indefinitely. About 4 percent of the area was occupied by these conditions.

Nonforested Area (73 percent)

Grasslands - Grasslands were found on about 42 percent of the area composed of 4 major types.

Wheatgrass-fescue - This is the major grassland type in Climatic Section 14 on all but the eastern portion. Vegetative structure is similar to that presented in Climatic Section 13.

Sagebrush-grass - This type is also described in Climatic Section 13. The type is limited and confined primarily to the upper Yellowstone River, the Big Timber area and northwest of the Crazy Mountains.

Wheatgrass-needleandthread - This type is confined to the eastern portion of the area with species more common in eastern Montana more important. The grass is relatively short varying from open to somewhat dense structure. Western wheatgrass, blue grama and needleandthread grass are the dominant species. Other species which may be present are bluebunch wheatgrass, bluestem, fringed sage, sedge, hairy goldaster, snakeweed and junegrass.

Alpine grassland - This community is found on a true alpine type above timberline. It is similar to the description found in Climatic Section 13. While these communities appear to be dominated by grasses, forbs play an important role in stand composition.

Other Areas - The remaining portion of the area is covered by a mixture of types such as rock, 28 percent, and lakes and streams, 3 percent.

CLIMATIC SECTION 15 - MUSSELSHELL

Climatic Section 15 occupies the central portion of Montana from Great Falls, Helena area east to the Musselshell River. Forests included are portions of the Helena and Lewis and Clark. Portions of Powell, Jefferson, Gallatin, Yellowstone, Cascade, Chouteau, Meagher, Lewis and Clark, Broadwater, Judith Basin, Wheatland, Fergus, Petroleum, Musselshell and Golden Valley counties are

included. Forest Service ownership is confined principally to the scattered small mountain ranges including a portion of the Big Belts, Little Belts, Highwoods, Big Snowy, Little Snow and Moccasin Ranges. Between these ranges are extensive areas of grass type primarily in non Forest Service ownership.

Forest communities are confined to the prominent mountain ranges and the Missouri River Breaks. Limestone derived soils play a significant role in the location of some plant communities within the area. About 20 percent of the Climatic Section is potentially forested with the remaining grassland. Weather conditions are typical of the continental climate east of the Continental Divide. Winter conditions are not quite as severe as Climatic Section 17 and forests are found on slightly lower elevations. Precipitation ranges from a high of about 40 inches on the highest peaks to 10-14 inches for the grass types. Temperature extremes are common during the winter months with high wind common throughout the year.

On mountainous slopes all rock types can be found with most showing evidence of glacial activity. Slopes are gentle to steep. In the foothills rock types are a mixture of volcanics, quartzite, argillite, granitic, limestone and sandstone. In most cases these are frost churned with only minor glacial activity. Slopes are gentle to moderate. In the plains soft sedimentaries are the major rock type most impacted by stream erosion. Slopes are gentle.

As in other portions of the state the discovery of gold attracted numerous people to this portion of the state in the 1860's. Activity here and in the Big and Little Belt Mountains caused a significant impact on the forest communities by the 1890's. The establishment of ranching and agricultural development between 1880's and 1900 also had a significant impact on all the forested areas. Ayres in his report indicated that 25 percent of the forested area was cut. The 1930's survey showed about 3 percent however this survey did not include the Neihart area where much of the harvest occurred. Chouteau and Judith Basin Counties had about 6 percent cutover by the 1930's.

Forested Types (20 percent)

Specific information on forest conditions is available for Cascade, Chouteau, Fergus and Judith Basin Counties which includes the Highwoods, Big Snowy, and the north east half of the Little Belt Mountains. More general information is available for the remaining portion of the Little Belt area. To date no early survey work has been found for the Big Belt or MacDonald Pass areas. Field studies conducted during 1992 and proposed for 1993 will provide some information on the historical structure of these sites.

Cascade County - Approximately 19 percent of the county is forested of which about 55 percent is in Forest Service ownership. Only 4 percent of the area is shown as cut which seems low when the early mining activity is considered. There is in addition 11 percent that is shown as nonstocked which could reflect some of the early cutting. Ponderosa pine comprised about 18 percent of the commercial forest area of which 31 percent was under 40 years of age. Only 5 percent may have met the old growth definition. Douglas-fir represented about 34 percent of the area. Old growth may have accounted for 3 percent of the stands with 35 percent less than 40 years of age. The most common species was lodgepole pine found on 47 percent of the commercial acres. Over 6 percent of the type was old enough to be considered potential old growth and only 21

percent less than 40 years of age. Less than one percent of the area contained Engelmann spruce which was 27 percent less than 40 years of age and about 3 percent may have qualified as old growth.

Chouteau County - Only about 2 percent of the county is in a forested condition with a major portion associated with the Highwood Mountains. This is also where much of the Forest Service ownership is located. The ponderosa pine cover type was found on 22 percent of the forested area none of which was in the Highwoods. About 89 percent was less than 40 years of age which suggests a major expansion of the type or heavy harvesting that was not recognized by the inventory. Much of this type would have been adjacent to the Missouri River where steep slopes may have resulted in more frequent stand replacement type of fires. The Douglas-fir type represented about a third of the forested area with 96 percent less than 40 years of age. Lodgepole pine made up the remaining 44 percent with 98 percent less than 40 years of age. Both of these types would have been associated with the Highwood Mountains and may reflect the frequent prairie fires that swept through the area. None of the stands in the county were old enough to qualify for old growth.

Fergus County - About 15 percent of the county was forested with Forest Service ownership found on the Big and Little Snowy Mountains. About 82 percent of the forested area was ponderosa pine of which about a third was shown as pine savanna type. About 83 percent was less than 40 years of age and about 3 percent old growth which represents a very young age structure for ponderosa pine. Douglas-fir and lodgepole pine both made up about 9 percent each of the forested area. About 58 percent of the Douglas-fir type and 69 percent of the lodgepole pine type were less than 40 years of age. None of the Douglas-fir type qualified as old growth but about 2 percent of the lodgepole pine type did meet the age criteria. A trace of Engelmann spruce also occurred in the County.

Judith Basin - This county is in the heart of Climatic Section 15 and includes the northeast portion of the Little Belt Mountain. While entry to the Little Belts occurred very early the northeast portion was less affected because of the lack of major mining activity. About 26 percent of the county is forested of which a significant portion is Forest Service ownership. Ponderosa pine is of moderate importance occupying about 13 percent of the forested area. Stands were young with only 7 percent classed as old growth and 79 percent less than 40 years of age. It is difficult to determine at this time if this structure was natural or the result of early harvest overlooked by the 1930 inventory. Douglas-fir is the most common cover type representing 44 percent of the forested area. These stands are also young aged with 60 percent less than 40 years of age however 20 percent was classed as old growth which is unusually high for this type. Lodgepole pine is a close second in area occurring on 42 percent of the area. Its age structure is older than normal with only 49 percent in the less than 40 year age category and about 16 percent meeting old growth definitions. These conditions represent the oldest age structure for the type that was identified by the 1930's inventory. A minor amount of Engelmann spruce occurred primarily in a mature to old growth condition.

Black cottonwood was common outside Forest Service holdings in riparian areas and made up a minor percent of the forested area. Stands were about evenly split between sawtimber and smaller sized material.

Non forest Types (80 percent)

Grasslands - Four major grass types were associated with this Climatic Section.

Wheatgrasses-needleandthread-green needlegrass - This type represents the major portion of the grasslands within this Climatic Section. On the moister sites with precipitation of about 15-19 inches rough fescue, Idaho fescue and bluebunch wheatgrass are the most common species. On clayey portions of this type bluebunch wheatgrass becomes more important. On sites with less than 14 inches of precipitation bluebunch wheatgrass, needleandthread and prairie junegrass are the most common species. Big sagebrush may be found on all portions of the type.

Wheatgrass-needleandthread-grama - This type is more common to the east of the Climatic Section. Precipitation ranges about 10-14 inches and the major species are bluebunch wheatgrass, western and thickspike wheatgrass and needleandthread. Both big and silver sagebrush may be present. On clayey portions of the type western and thickspike wheatgrass are dominant and silver sage may be absent.

Sagebrush-grass - A small area of this type was found around Winnett. Major vegetation consisted of western and thickspike wheatgrass, bluebunch wheatgrass and green needlegrass. Big sagebrush was a common species also.

Wheatgrass-fescue - A minor amount of this type was found adjacent to the isolated mountains within the Climatic Section. Rough fescue, Idaho fescue and bluebunch wheatgrass were major components.

TABLE 11 - PERCENT ACRES BY AGE CLASS BY COVER TYPE FOR CLIMATIC SECTION 15
Forest Service Acres** Only

COVER TYPE	NON STOCKED	SEEDINGS & SAPLINGS 1-40 YRS	POLES 41-60 YRS	IMMATURE 61-100 YRS	MATURE 101-VAR.YRS	POTENTIAL OLD GROWTH 121+*YRS
Ponderosa P	9.4	71.7	9.2	3.0	2.6	4.0
Douglas-Fir	12.2	54.2	9.5	4.8	5.2	13.2
Engelmann spruce	0.8	63.6	10.2	12.3	3.2	9.9
Lodgepole P	11.2	52.1	13.5	11.0	9.6	9.0
Avg for Climatic A.	10.9	59.3	10.8	6.4	2.2	10.4

** This data represents only the eastern half of the Climatic Section. Stands in the Big Belts and MacDonald Pass area contained older aged conditions particularly for ponderosa pine however specific information in not currently available for this portion.

CLIMATIC SECTION 16 - ROCKY MOUNTAIN FRONT

Climatic Section 16 is situated east of the Continental Divide from the Canadian border south to the Missouri River. The eastern boundary follows the edge of the foothills west of Interstate 15. It covers a portion of the Lewis

and Clark Forest and portions of Toole, Glacier, Pondera, Teton, Lewis and Clark and Cascade Counties.

Forests cover about 14 percent of the area with the remaining in grassland communities. Precipitation reaches a high of 120 inches along the Continental Divide to a low of 12 inches along the eastern boundary. Weather patterns are marked by extremes with severe chinook winds and dramatic fluctuations of winter temperatures. Red belt conditions associated with these weather patterns is common on exposed slopes. Some of the most extensive aspen groves in the state along with large stands of limber pine are common along the lower skirts of the mountains.

A major impact on the forest communities occurred about 1892 with the construction of the Great Northern Railway. Not only were significant amounts of timber harvested to construct this railway but also a number of fires started by this activity burned a major area in the vicinity of Summit and Essex.

Intensive surveys are limited however a portion was covered during the survey for the Lewis and Clark Reserve in the 1890's.

Forested Types

Douglas-fir - The type was generally found below 6500 feet and described as containing small and very defective trees with some individuals up to 30 inches in diameter. The type occupied a minor portion of the area and much of it had been burned during the 1889 fire year. Stand structure appears to have been similar to Climatic Section 15.

Engelmann Spruce - This was a limited type and probably occupied less than 10 percent of the area however it represented most of the mature stands in the area. This type was found in the canyon bottoms and some moist benches with some stands about 200 years of age. Most of the older stands were found in Swift Current and St. Mary's drainages.

Lodgepole pine - The type was the major forest vegetation type and was found occupying the upper slopes. Age structure was similar to Climatic Section 15 with stands dominated by trees less than 40 years of age and only limited old growth.

Foothill savanna - A significant portion of the area is occupied by open stands of Douglas-fir or limber pine and/or aspen. Most of these sites showed repeated fire impact.

Black cottonwood - This type was common along the major drainages and was primarily composed of pole aged stands.

Non-forested Area

Grasslands - The grasslands in this Climatic Section are represented by three major types with variations in species dominance dependent on precipitation and soil type.

Wheatgrass-fescue - This is a common type in western Montana and in the northern portion of the state. This location represents its most eastern occurrence. On precipitation sites of from 20-24 inches rough fescue, needlegrasses and mountain brome are the most common species. This type also includes areas of shrub growth. These sites were normally associated with riparian areas or seeps which were common along the lower foothills on the eastern portion of the Climatic Section. Willows and shrubby aspen were common species. Downslope in the 15-19 inch zone, community structure is dominated by rough fescue, Idaho fescue and bluebunch wheatgrass. The drier portions which range from 10-14 inches of precipitation were mainly bluebunch wheatgrass, needleandthread and prairie junegrass. On all these sites big sagebrush may be found.

Needleandthread-wheatgrass-grama - This type is primarily confined to the north central and north eastern portions of the state. Major species are needleandthread, western and thickspiked wheatgrass and green needlegrass. Silver sagebrush could also be present.

Wheatgrasses-needleandthread-green needlegrass - The major area for this type is in central and south east portions of the state. Most common species included green needlegrass, western and thickspike wheatgrass and bluebunch wheatgrass. This type tends to be associated with clayey soils and on areas of more silty soils needleandthread is the most common species along with the wheatgrasses. While silver sage may be on the silty portions of the type it apparently was limited elsewhere.

INCOMPLETE SECTIONS

The following areas are principally grassland types that have not been thourghly investigated. Some preliminary information on general cover types is presented with more complete information to be available in subsequent drafts.

CLIMATIC SECTION 17 - MISSOURI

This section includes all or portions of Blaine, Hill, Liberty, Phillips, Pondera, Teton, Toole, Pdtroleum, Cascade, Chouteau and Fergus. About 3.5 percent were forested with 0.5 percent noncommercial, 0.3 percent hardwood bottoms.

CLIMATIC SECTION 18 - FORT PECK

While some boundary adjustments may be made the Section currently includes Rosebud, Treasure, Yellowstone, Blaine, Daniels, Dawson, Musselshell, Garfield, Petroleum, McCone, Phillips, Prairie, Richland, Roosevelt, and Valley. Only about 1.3 percent of the area is in forested conditions.

CLIMATIC SECTION 19 - TONGUE-POWDER

This is a large area in the southeast corner of Montana which includes Big Horn, Treasure, Yellowstone, Carbon, Carter, Dawson, Musselshell, Custer, Fallon, Golden Valley, Powder River, Prairie, Rosebud, Stillwater, Wheatland, and Wibaux counties. A little over 5.3 percent of the Section is forested with about 1 percent non commercial and 0.3 percent hardwood bottoms.

CLIMATIC SECTION 22 - LITTLE MUDDY

Much of this section is in the Dakotas and Canada with a small area in the northeast section of the state. It includes portions of Daniels, Dawson, Richland, Roosevelt, and Sheridan. This area is almost devoid of forested cover types with only 0.25 percent present as hardwood bottoms.

FOREST COMPOSITION FOR EASTERN MONTANA

SPECIES	SOUTH CENTRAL	NORTHERN	SOUTHERN
PP	3.8	8.1	23.0
L	T	-	-
DF	45.3	17.7	26.1
AF	1.6	3.6	1.5
ES	16.5	17.8	14.3
LP	29.5	8.6	26.5
WBP	2.6	2.4	4.8
ASPEN-COTTONWOOD	0.7	41.8	3.8
VOLUME/ACRE	8.6	4.4	7.9

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APPENDIX C

NORTHERN REGION INFORMATION CENTER

Northern Region
Information Center

April 1994

Introduction

The Northern Region Information Center is a repository of various information resources used in the management and planning of the activities of the Northern Region, USDA, Forest Service.

The information resources in the Information Center are obtained and/or compiled from a variety of sources to meet the program and management needs of the Northern Region.

Spatial Data

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Montana Townships	Montana's townships, digitized by the Montana Dept. of Community Affairs in the 1970's from 1:250,000 scale maps. We know that some of the township corners in this data are almost a mile away from their probable true positions.	04-13-1992	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1960
bea evaluation area	bitterroot grizzly bear analysis area evaluation area bdry - 50 meter pixels this file is vectorized as /files/public/gis_arc/bt_grlz/evalarea in utm zone 12	09-30-1992	USDA Forest Service/R1 - Northern Region/MS	1:250,000	07-19-1985
bea administrative unit boundaries	bitterroot grizzly bear analysis area administrative unit boundaries 10/91 from 1:24,000 base maps (USGS 7.5 minute quads) this file is also in raster format as /files/public/gis_arc/bt_grlz/admin-grid	09-30-1992	Clearwater National Forest - USDA Forest Service	1:24,000	10-01-1991
Montana Counties	Montana's counties, digitized by the Montana Dept. of Community Affairs in the 1970's from 1:250,000 scale maps.	04-13-1992	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1960
Region 1 Wilderness Areas	Region 1 wilderness areas scanned in 1992. Some areas were scanned from 1:500,000 Rarell maps and others from wilderness maps and mylars with a variety of scales and quality control measures	07-16-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1992
Bitterroot Grizzly Bear Eval Admin Area Bdrys	bitterroot grizzly bear analysis area administrative areas-50 meter pixels this file is vectorized as /files/public/gis_arc/bt_grlz/arc/admin in utm zone 12 delineated onto USGS 7.5 minute quads	09-30-1992	Clearwater National Forest - USDA Forest Service	1:250,000	07-19-1985
Bitterroot Grizzly Bear Eval Area Admin Sites	bitterroot grizzly bear analysis area Forest Service administrative sites plotted onto USGS 7.5 minute maps	10-15-1992	Clearwater National Forest - USDA Forest Service	1:240,00	11-01-1991
Montana National Forests w/ land ownership	These National Forest boundaries were digitized form Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	02-17-1991	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Beaverhead National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Beaverhead National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Bitterroot National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720 This coverage is also broken into the Idaho portion (f03_id_bdry) and the Montana portion (f03_mt_bdry) as two separate covers.	05-20-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Beaverhead National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	05-20-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Custer National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	07-14-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Deerlodge National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Flathead National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Flathead National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Gallatin National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Gallatin National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Helena National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Beaverhead National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Kootenai National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Kootenai National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Lewis and Clark National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Lewis & Clark National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Lolo National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Lolo National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	01-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Region 1 and some Region 4 rarell and wilderness areas	1983 rarell and wilderness areas with 1983 names covering USFS Region 1 and some of Region 4 (rarell areas are roadless areas) This was scanned from 1:500,000 maps	04-04-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1983
North and South Dakota Forest boundaries	North and South Dakota Forest boundaries digitized at 1:126,720 from Forest Service Northern Region map 1983	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983
Idaho Panhandle National Forest boundary	Idaho Panhandle National Forest boundary digitized at 1:126,720 from maps digitized by USFS Northern Region Cartography	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1987
Idaho Panhandle Nat'l Forest district boundaries	Idaho Panhandle National Forest district boundaries digitized at 1:126,720 Forest Service Northern Region map 1983	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983
Clearwater National Forest boundary	Clearwater National Forest boundary digitized at 1:126,720 from Cartography at Forest Service Northern Region	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1987
Clearwater Nat'l Forest district boundaries	Clearwater National Forest district boundaries digitized at 1:126,720 Forest Service Northern Region map 1983	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983
Nezperce National Forest boundary	Nezperce National Forest boundary digitized at 1:126,720 from cartography at the Forest Service Northern Region	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1987
Nezperce Nat'l Forest district boundaries	Nezperce National Forest district boundaries digitized at 1:126,720 Forest Service Northern Region map 1983	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Montana Nat'l Parks, Nat areas & Wildlife Refuges	combination of 3 separate coverages - Nat Parks, Wildlife Refuges and designated Natural Areas. The National Parks were digitized by the Natural Heritage Program from 1:100,000 scale USGS and 1:126,720 scale Forest Servic maps. Natural areas were digitized from 1:24,000 scale maps by the Heritage Program. Refuges were digitzed in the 70's from 1:250,000 scale maps. Some of them were updated from 1:100,000 scale maps by the Heritage Program.	05-07-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Montana Indian Reservations	Montana's Indian reservations, Imported from the Montana Features file, digitized from 1:250,000 scale maps In the 1970's, provided by ISD. These should probably not be used for maps at a scale any larger than 1:250,000 as they are not very accurate. I believe the boundry of the Rocky Boy Indian Reservation has changed considerably since this data was digitized.	02-05-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Idaho counties	This coverage was digitized from 1:100,000 scale maps by the Idaho Division of Water Resources	05-28-1992	Montana State Library - Clark Fork GIS Project	1:100,000	01-01-1911
Idaho boundary	This coverage was digitized from 1:100,000 scale maps by the Idaho Division of Water Resources This coverage Is also kept In UTM zone 11 and Is called Id_bdry11	05-28-1992	Montana State Library - Clark Fork GIS Project	1:100,000	01-01-1911
Idaho ownership	Land Ownership for Idaho (major federal, state and private agency) from USGS-BLM Surface Land Management Status Maps at digitized by the Idaho Division of Water Resources at 1:100,000 This map covers the portion of Idaho In the USFS Northern Region 1	07-06-1992	Idaho Cooperative Fish and Wiidiife Research Unit - Universlty of Idaho	1:100,000	01-01-1990
Index to USGS 7.5 minute digital products	All of the 7.5 minute quads In Montana, with items which Indicate with a Y or or N whether or not certain digital products are available from USGS for that quad. Several programs - DLGFIX.F77, DEMFIX.F77, DLGIDX.AML and the INFO rogram QUADTRAN, are available for updating this coverage from new USGS Index files. This coverage Is the UTM zone 12 version, which must by updated from the PAT of the geographic projection version	09-27-1990	Montana State Library - Clark Fork GIS Project	1:24,000	08-12-1990

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Idaho ownership	This coverage was digitized from 1:100,000 scale maps by the Idaho Division of Water Resources and shows land ownership within Nat'l Forest boundaries. Wilderness boundaries have been added from 1:500,000 rarell maps and from wilderness maps nad mylars with a variety of scales and quality control measures. The ownership is identified by major federal, state and private agency. This covers only the portion of Idaho within USFS Northern Region.	07-06-1992	Montana State Library - Clark Fork GIS Project	1:100,000	01-01-1990
Region 1 National Forest district boundaries	National Forest district boundaries digitized at 1:126,720 from 1983 Forest Service Northern Region map	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983
Idaho Land Ownership	Land Ownership for Idaho (major federal, state and private agency) from USGS-BLM Surface Land Management Status Maps at digitized by the Idaho Division of Water Resources at 1:100,000 This map is in UTM Zone12, it is also kept in Zone11 as ownership11	01-01-1990	Idaho Cooperative Fish and Wildlife Research Unit - University of Idaho	1:100,000	01-01-1990
Bitterroot Grizzly Bear Eval Area Land Ownership	bitterroot grizzly bear analysis area land ownership 1:100,000 Idaho gap analysis land ownership Montana Ownership within BEA digitized form USGS 7.5 minyte quads	10-15-1992	Clearwater National Forest - USDA Forest Service	1:100,000	05-01-1991
Region 1 Indian Reservations	Region 1s Indian Reserv. Montanas were imported from the Montana Features file, digitized from 1:250,000 scale maps in the 1970's, provided by ISD. These are not very accurate. I believe the boundary of the Rocky Boy Reservation has changed considerably since this data was digitized. The Idaho and Dakota Reservations were scanned in 1992 from the 1:1,000,000 Forest Service Region 1 Forest map UTM projection.	07-22-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Region 1 National Parks	The National Parks for Montana were digitized by the Heritage Program from 1:100,000 USGS and 1:126.720 Forest Service maps. The Dakota National Parks were scanned in 1992 from the USFS Northern Region map at 1:100,000 projected in UTM's.	05-07-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Beaverhead National Forest w/ land ownership	These Beaverhead NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Bitterroot National Forest w/ land ownership	These Bitterroot NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-23-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Idaho Panhandle National Forest w/ land ownership	The outer Idaho Panhandle NF boundary was digitized from Forest Visitor maps at 1:126,720 - The ownership was digitized by the Idaho Division of Water Resources from USGS-BLM Surface Land Management Status Maps at 1:100,000 The ownership is identified by major federal, state and private agency.	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1987
Bitterroot National Forest w/ land ownership	These Bitterroot NF boundaries were digitized from Forest Visitors Maps at 1:126,720. This map only shows the Bitterroot NF within Montana. They include ownership boundaries for areas inside Congressional forest boundaries	09-23-1991	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Custer National Forest w/ land ownership	These Custer NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-23-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Custer National Forest district boundaries	These National Forest district boundaries were digitized from the Forest Visitors map at 1:126,720	11-08-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Derrlodge National Forest boundary	This National Forest boundary was digitized from the Forest Visitors Map at 1:126,720	09-14-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Deerlodge National Forest w/ land ownership	These Deerlodge NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Flathead National Forest w/ land ownership	These Flathead NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Clearwater National Forest w/ land ownership	The outer Clearwater NF boundary was digitized from Forest Visitor maps at 1:126,720 - The ownership was digitized by the Idaho Division of Water Resources from USGS-BLM Surface Land Management Status Maps at 1:100,000 The ownership is identified by major federal, state and private agency.	11-19-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1987
Gallatin National Forest w/ land ownership	These Gallatin NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Helena National Forest w/ land ownership	These Helena NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Kootenai National Forest w/ land ownership	These Kootenai NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Lewis and Clark National Forest w/ land ownership	These Lewis and Clark NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Lolo National Forest w/ land ownership	These Lolo NF boundaries were digitized from Forest Visitors Maps at 1:126,720 They include ownership boundaries for areas inside Congressional forest boundaries	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Nezperce National Forest w/ land ownership	The outer Nezperce NF boundary was digitized from Forest Visitor maps at 1:126,720 - The ownership was digitized by the Idaho Division of Water Resources from USGS-BLM Surface Land Management Status Maps at 1:100,000 The ownership is identified by major federal, state and private agency.	09-22-1993	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1987
Region 1 National Forest boundaries	Idaho National Forest boundaries digitized at 1:126,720 from 1983 Forest Service Northern Region map This coverage is in UTM Zone12 and is also kept in Zone11 as id_for_bdry11	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Idaho Region 1 National Forest district boundaries	National Forest district boundaries digitized at 1:126,720 from 1983 Forest Service Northern Region map	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1983
USFS Northern Region Boundary	USFS Northern Region Boundary digitized by the Montana Dept. of Community Montana Dept. of Community Affairs In the 1970's from 1:250,000 scale maps, the Idaho portion was digitized from 1:100,000 scale maps by the Idaho Division of Water Resources from unknown source(s), and the Dakota portion was digitized at the USFS Northern Region office from 1:1,000,000 maps.	12-22-1993	USDA Forest Service/R1 - Northern Region/MS	1:1,000,000	01-01-1960
Region 1 and other Wilderness Areas	Region 1 plus areas from other regions wilderness areas scanned in 1992. Some areas were scanned from 1:500,000 Rarell maps and others from wilderness maps and mylars with a variety of scales and quality control measures	12-08-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1992
Region 1 National Forest boundaries	The Monatana National Forest boundaries were digitized form Forest Visitors Maps at 1:126,720. The Idaho National Forest boundaries were digitized from 1:100,000 scale maps by the Idaho Division of Water Resources. The Dakota National Forest boundaries were digitized at 1:126,720 from Forest Service Northern Region man 1983.	10-10-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Montana National Forest and District Boundaries	These National Forest boundaries were digitized from Forest Visitors Maps at 1:126,720	02-17-1991	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
Montana National Forest Boundaries	These National Forest boundaries were digitized form Forest Visitors Maps at 1:126,720	02-17-1991	Montana State Library - Clark Fork GIS Project	1:126,720	01-01-1975
bea aspects	bitterroot grizzly bear analysis area aspects-50 meter pixels from landsat Imagery	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985
Climate Zones	A further division of Robert Baileys hierarchical ecosystem landunits of the United States but covering only USFS Northern Region. This map was originally drawn on the Subsections (LTA) map and digitized at 1:1,000,000 by Wendall Hahn and John Nesson of the USFS The data for this coverage is stored in the climate.key file	02-16-1993	USDA Forest Service/R1 - Northern Region/MS	1:1,000,000	01-01-1993

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Montana Cities	72 of Montana's cities, digitized by the Montana Dept. of Community Affairs In the 1970's from 1:250,000 scale maps. We do not know why some towns are included In this list while other larger towns are excluded. These should probably not be used for maps at a scale any larger than 1:250,000 as they are not very accurate.	02-05-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Bitterroot Grizzly Bear Eval Area Town Points	bitterroot grizzly bear analysis area small towns represented by points source was USGS 7.5 minute quad maps 1:24,000	10-15-1992	Clearwater National Forest - USDA Forest Service	1:24,000	11-01-1991
Bitterroot Grizzly Bear Eval Area Town Polygons	bitterroot grizzly bear analysis area towns large enough to be represented by polygons 1:24000 the source was USGS 7.5 minute quads	10-15-1992	Clearwater National Forest - USDA Forest Service	1:24,000	11-01-1991
Major Cities in Idaho	This coverage was created at the Northern Region Office in Arc/Info. The land ownership was put in the background and city points were added by landmark.	09-23-1994	USDA Forest Service/R1 - Northern Region/MS	1:100,000	01-01-1990
bea elevations	bitterroot grizzly bear analysis area elevations-50 meter pixels from landsat imagery	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985
Baileys Ecological Divisions	A division of Robert Baileys hierarchical ecosystem landunits of the United States This map shows Divisions scanned from 1986 maps at a scale of 1:5,000,000 In Lambert Equal-Area projection	04-29-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993
Baileys Ecological Domain	A division of Robert Baileys hierarchical ecosystem landunits of the United States This map shows Domains scanned from 1986 maps at a scale of 1:5,000,000 In Lambert Equal-Area projection	04-26-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993
Baileys Ecological Provinces	A division of Robert Baileys hierarchical ecosystem landunits of the United States This map shows Provinces scanned from 1986 maps at a scale of 1:5.000,000 In Lambert Equal-Area projection	05-03-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993
Baileys Ecological Sections	A division of Robert Baileys hierarchical ecosystem landunits of the United States In Lambert Equal-Area Projection. This map shows Sections scanned from 1986 maps at a scale of 1:5,000,000 This coverage Is also available In UTM Zone 12 for USFS Northern Region only and is titled r1-bailey-sec.	05-03-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Landscape Analysis Units of USFS Northern Region 1	Ecosystem landunits of USFS Northern Region 1 - a further delinlation of the subsections map (delineated from Baileys sections) scanned at 1:500,000 This map was created from maps of northern Idaho (1990), central, eastern and western Montana (1976), and North and South Dakota (1990)	02-16-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1993
Landtype Associations of the USFS Northern Region	A further division of Robert Baileys hierarchical ecosystem landunits of the United States (Sections) but covering only USFS Northern Region 1 This map shows presuppression forest vegetation types known as Landtype Associations. These were created and scanned in 1992-3 from unknown sources at 1:500,000 by Wendell Hahn and Skip Barndt of the USFS.	02-01-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1993
Hammonds Land Surface Forms	Hammonds land surface forms scanned from 1:5,000,000 maps in Lambert Equal-Area projection covering the lower 48 states. The data is coded and a look-up table is not yet available but will be in the Oracle database when complete This coverage is also available in UTM Zone 12 for USFS Northern Region only and is titled r1-lsf.	06-18-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993
major historic vegetation cover types	This map shows historic vegetation types from approximately the 1930's and covers the USFS Northern Region 1 - the projection is UTM zone 12 These were created and scanned in 1992-3 from unknown sources at 1:500,000 by Wendell Hahn and Skip Barndt of the USFS The data for this coverage is coded and there is no look-up table completed when it is done it will be found in the Oracle database	02-01-1993	USDA Forest Service/R1 - Northern Region/MS	1:500,000	01-01-1993
Omerniks ecoregions	Omerniks ecoregions of the United States 1:750,000 This map was created from the raster file omernik-rast (still on file) it is in lambert equal-area projection (radius of the sphere of reference = 0.0, longitude = -100 00 00, latitude = 45 00 00, false easting and northing are both 0.0) We also have it in Lambert Conic Conformal projection (omernik-lcc)	08-03-1993	Southern Forest Experiment Station - USDA Forest Service	1:750,000	01-01-1993

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Potential Natural Vegetation by A.W.Kuchler	This map shows the potential natural vegetation for the lower 48 states in Lambert Equal-Area projection. We think this may be a newer version than the source documentation listed at 01/01/1961 but we're not sure. We recieved this coverage electronically from the Forest Service in Region 2. Region 2 received it from one of the research stations.	12-08-1993	USDA Forest Service/R1 - Northern Region/MS	1:3,168,000	01-01-1961
Baileys Ecological Provinces for North America	A division of Robert Baileys hierarchical ecosystem landunits of North America This map shows Provinces scanned from 1986 maps at a scale of 1:5.000,000 In Lambert Equal-Area projection	05-03-1993	USDA Forest Service/R1 - Northern Region/MS	1:5,000,000	01-01-1993
Bailey's Ecoregions of the Continents	The National Ecology Research Center digitized the Ecoregions of the Continents map (Robert G. Bailey, USDA Forest Service, Wah., 1989) at a scale of 1:30,000,000 using an Altek Model 34-3 tablet. The projection is believed to be one of G.A. Ginzburg's modified polyconic projections. It is not possible to transform Ecoworld without knowing the projection of the source map. Rubber sheeting can be applied with questionable accuracy.	01-01-1989	USDA Forest Service/R1 - Northern Region/MS	1:30,000,000	01-01-1989
Montana USGS Geographic Names	Point locations for geographic names, taken from the USGS geographic names information system file of March 23,1982. Includes all names of features in the area covered by the Butte North 1:100,000 scale quad. Names are taken by the USGS from the 1:24:000 and 1:62,500 scale quads.	01-19-1989	Montana State Library - Clark Fork GIS Project	1:24,000	01-01-1967
Montana and Idaho 1-degree lat/long grid	Latitude.longitude grid for Montana, 3 minute interval between arc vertices	09-27-1990	Montana State Library - Clark Fork GIS Project	n/a	09-27-1990
Montana and Idaho Lakes	Montana lakes were digitized by the USGS from the reference map sheets that that appear in the 1976 National Atlas of the US from 1:2,000,000 USGS DLG's The Idaho lakes were taken from 1:100,000 USGS-BLM Surface Land Management Status Maps and were compiled by the Idaho Cooperative Fish and Wildlife Research Unit at the University of Idaho in Moscow The Montana data is from 1950 and is not very good.	07-22-1992	Montana State Library - Clark Fork GIS Project	1:2,000,000	01-01-1976

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Montana Streams from 1:2,000,000 USGS DLGs	These arcs were digitized by the USGS from the reference map sheets that appear in the 1976 National Atlas of the US. They were provided by the USGS Helena office. We think these were from 1:2,000,000 scale digital line graphs, but we don't know. We do know that they aren't very good.	04-13-1992	Montana State Library - Clark Fork GIS Project	1:2000000	01-01-1950
bea hydrology	bitterroot grizzly bear analysis area hydrology-50 meter pixels from landsat imagery this file is vectorized as /files/public/gis_arc/bt_griz/arc/hydro in utm zone 12	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985
Beaverhead Project watersheds	Beaverhead project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map	08-05-1993	USDA Forest Service/R1 - Northern Region/MS	1:126720	01-13-1993
Bitterroot Project watersheds	Bitterroot project watersheds scanned by USFS-R1-MS 2/93 from 1:126,720 Forest visitor map	04-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	12-01-1993
Idaho Panhhandle Project Watersheds	Idaho Panhandle project watersheds scanned by USFS-R1-MS 1/93 from 1:168,960 (3/8" = 1 mile) mylars	07-14-1993	USDA Forest Service/R1 - Northern Region/MS	1:168,960	10-01-1992
Clearwater Project watersheds	Clearwater project watersheds scanned by USFS-R1-MS 11/93 from 1:126,720 Forest visitor map	11-19-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	12-01-1993
Deerlodge Project watersheds	Deerlodge project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map	02-01-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	10-01-1983
Flathead Project watersheds	Flathead project watersheds digitized by the Flathead NF in 1992 at 1:24,000 using Jelly.	04-27-1993	USDA Forest Service/R1 - Northern Region/MS	1:24,000	12-01-1992
Gallatin Project Watersheds	Gallatin project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map	04-09-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	12-01-1993
Helena Project watersheds	Helena project watersheds were scanned from 1:24,000 mylars in UTM Zone 12	09-12-1993	USDA Forest Service/R1 - Northern Region/MS	1:24,000	07-01-1989
Kootenai Project watersheds	Kootenai project watersheds digitized and scanned between 1/92 and 8/92 from 1:24,000 mylars (bases were vaccuum-framed from chronoflex orlginals).	07-15-1993	USDA Forest Service/R1 - Northern Region/MS	1:24,000	08-01-1992
Lewis and Clark Project watersheds	Lewis and Clark project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map	02-01-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	12-01-1993

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Lolo Project watersheds	Lolo project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map	02-26-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	12-01-1993
Nezperce Project watersheds	Nezperce project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map The source vbase map was 1/2"/mile map reproduced photographically at 3/8" to the mile on base stable mylar.	04-09-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	09-01-1991
US Hydrologic Units	US hierarchical hydrologic units scanned from 1992-3 data at 1:500,000 The hierarchy from largest to smallest consists of regions,subregions, accounting and cataloging units This data was obtained from the Environmental Protection Agency	05-25-1993	USDA Forest Service/R1 - Northern Region/MS	1:7,500,000	01-01-1993
US Hydrologic Regions	US hierarchical hydrologic regions scanned from 1992-3 data at 1:500,000 The hierarchy from largest to smallest consists of regions,subregions, accounting and cataloging units This data was obtained from the Environmental Protection Agency	05-26-1993	USDA Forest Service/R1 - Northern Region/MS	1:7,500,000	01-01-1993
US Hydrologic Subregions	US hierarchical hydrologic subregions scanned from 1992-3 data at 1:500,000 The hierarchy from largest to smallest consists of regions,subregions, accounting and cataloging units This data was obtained from the Environmental Protection Agency	05-26-1993	USDA Forest Service/R1 - Northern Region/MS	1:7,500,000	01-01-1993
US Hydrologic Accounting Units	US hierarchical hydrologic account units scanned from 1992-3 1:500,000 data The hierarchy from largest to smallest consists of regions,subregions, accounting and cataloging units This data was obtained from the Environmental Protection Agency	05-26-1993	USDA Forest Service/R1 - Northern Region/MS	1:7,500,000	01-01-1993
Custer Project watersheds	Custer project watersheds scanned by USFS-R1-MS 5/93 from 1:126,720 Forest visitor map	07-07-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1993
Montana basins	We think this was originally digitized at 1:2,000,000 scale by the USGS. They later made it fit the 100,000 scale DLG hydrography.	03-08-1993	Montana State Library - Clark Fork GIS Project	1:2,000,000	01-01-1911
Bitterroot Grizzly Bear Eval Area Hydrology	bitterroot grizzly bear analysis area hydrology (stream centers and water bodies from 1:100,000 USGS DLG files this file is also in raster format as /files/public/gis_arc/bt_griz/hydro-grid	09-30-1992	Clearwater National Forest - USDA Forest Service	1:100,000	08-01-1991

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Idaho hydrology	This coverage was digitized from 1:100,000 scale maps by the Idaho Division of Water Resources	07-06-1992	Montana State Library - Clark Fork GIS Project	1:100,000	01-01-1911
Idaho Lakes		07-22-1992	Montana State Library - Clark Fork GIS Project	1:100,000	01-01-1976
Montana Lakes	Montana lakes were digitized by the USGS from the reference map sheets that that appear in the 1976 National Atlas of the US from 1:2,000,000 USGS DLG's The data is from 1950 and is not very good.	05-27-1992	Montana State Library - Clark Fork GIS Project	1:2,000,000	01-01-1976
Beaverhead Project watersheds/just USFS Lands	Beaverhead project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-22-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Idaho Panhhandle Project Watersheds/just USFS Land	Idaho Panhandle project watersheds scanned by USFS-R1-MS 1/93 from 1:168,960 (3/8" = 1 mile) mylars Land ownership other than Forest Service Lands has been cut out of the watersheds using USGS-BLM Surface Land Management Status Maps digitized by the Idaho Division of Water Resources at 1:100,000 in 1990	09-22-1993	USDA Forest Service/R1 - Northern Region/MS	1:168,960	01-01-1990
Bitterroot Project watersheds/just USFS Lands	Bitterroot project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-23-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Clearwater Project Watersheds/just USFS Lands	Clearwater project watersheds scanned by USFS-R1-MS 1/93 from 1:168,960 (3/8" = 1 mile) mylars Land ownership other than Forest Service Lands has been cut out of the watersheds using USGS-BLM Surface Land Management Status Maps digitized by the Idaho Division of Water Resources at 1:100,000 in 1990	11-19-1993	USDA Forest Service/R1 - Northern Region/MS	1:168,960	01-01-1990
Custer Project watersheds/ just USFS Lands	Custer project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-23-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Deerlodge Project watersheds/just USFS Lands	Deerlodge project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Flathead Project watersheds/just USFS Lands	Flathead project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Gallatin Project watersheds/ just USFS Lands	Gallatin project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Helena Project watersheds/ just USFS Lands	Helena project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Lewis & Clark Project watersheds/just USFS Lands	Lewis & Clark project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 -Northern Region/MS	1:126,720	01-01-1975
Lolo Project watersheds/just USFS Lands	Lolo project watersheds scanned by USFS-R1-MS 1/93 from 1:126,720 Forest visitor map Land ownership other than Forest Service Lands has been cut out of the watersheds using 1:126,720 Forest visitor maps from 1975.	09-24-1993	USDA Forest Service/R1 - Northern Region/MS	1:126,720	01-01-1975
Nezperce Project Watersheds/just USFS Land	Nezperce project watersheds scanned by USFS-R1-MS 1/93 from 1:168,960 (3/8" = 1 mile) mylars Land ownership other than Forest Service Lands has been cut out of the watersheds using USGS-BLM Surface Land Management Status Maps digitized by the Idaho Division of Water Resources at 1:100,000 In 1990	11-17-1993	USDA Forest Service/R1 - Northern Region/MS	1:168,960	01-01-1990

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Specially designated management areas of Idaho	Specially designated management areas in Idaho from the Idaho Conservation Data Center managed area data base with a scale of 1:100,000 This coverage is stored in UTM zone 11 and 12 (manarea11)	01-01-1990	Idaho Cooperative Fish and Wildlife Research Unit - University of Idaho	1:100,000	01-01-1990
Bitterroot Grizzly Bear Evaluation Area	Bitterroot Grizzly Bear Further Evaluation Area Boundary delineated from 1:24,000 maps this coverage is also found in /files/public/gis_arc/bt_griz	05-01-1991	Clearwater National Forest - USDA Forest Service	1:24,000	05-01-1991
Montana mine locations	Montana mineral deposits from the US Bureau of Mines Minerals Availability System. Gives type of mine, major commodities produced, township, range, and section, status and owner. Coordinates come from various sources and accuracy has not been checked.	03-12-1991	Montana State Library - Clark Fork GIS Project	1:24,000	01-01-1901
scenic byway logo	scanned at r1 from hardcopy recieved from r1 engineering - imported as tiff file into arc info - converted to grid - converted to vectors - needs FS shield in upper left corner and needs shading - vertical shading on top polygon and horizontal shading in side polys This logo is also stored is a tiff file (byway.tif)	10-30-1992	USDA Forest Service/R1 - Northern Region/MS	n/a	10-30-1992
Montana Natural Heritage Sites	Species and plant communities of special concern that have been located by the Montana Natural Heritage Preogram. This data is confidential and should not be released without permission of the Heritage Program (406) 444-3009.	03-12-1991	Montana State Library - Clark Fork GIS Project	1:24,000	03-12-1991
Bitterroot Grizzly Bear Eval Area Ecoplots	bitterroot grizzly bear analysis area ecoplots locations 1:24000 plotted onto USGS 7.5 minute quads	10-15-1992	Clearwater National Forest - USDA Forest Service	1:24,000	05-01-1991
Bitterroot Grizzly Bear Eval Area Campgrounds	bitterroot grizzly bear analysis area campgrounds 1:24000 plotted onto USGS 7.5 minute quads	10-15-1992	Clearwater National Forest - USDA Forest Service	1:24,000	11-01-1991
Montana Highways	Montana's highways, digitized by the Montana Dept. of Community Affairs in the 1970's from 1:250,000 scale maps. Because this data is very old, some interstate routes are represented by the old US highways that they have replaced.	04-13-1992	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1960
Bitterroot Grizzly Bear Eval Area Transportation	bitterroot grizzly bear analysis area roads and trails 1:100,000 from USGS DLG files	10-15-1992	Clearwater National Forest - USDA Forest Service	1:100,000	09-01-1991

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Montana Railroads	Montana railroads from the Montana Features file, digitized from USGS 1:250,000 scale maps in the 1970's, provided by ISD. These should not be used at a scale larger than 1:250,000, as they are not very accurate. This coverage contains many railroads that have been abandoned or torn up. The name given each railroad is usually the railroad that operated that line during the 40s or 50s.	02-05-1991	Montana State Library - Clark Fork GIS Project	1:250,000	01-01-1953
Northern Idaho and Western Montana Railroads	Northern Idaho and Western Montana Railroads joined from 1:100,000 DLG's from GSC (USFS Geometronics Service Center).	11-18-1992	Geometronics Service Center - USDA Forest Service	1:100,000	01-01-1900
bea slopes	bitterroot grizzly bear analysis area slopes-50 meter pixels from landsat imagery	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985
STATSGO soils for Montana	The State Soil Geographic Database (STATSGO) was produced by the USDA Soil Conservation Service for the state of Montana. The soils were mapped at a scale of 1:250,000 1 by 2 degree quad unit with a 640-acre minimum size map unit deliniation. These were recieved in Albers projection but are now in UTM Zone 12. Maps containing this data must contain the source and date and the notation in the STATSGO documentation on page 18 (at USFS Region 1 RO).	11-01-1991	USDA SOIL CONSERVATION SERVICE - NATIONAL CARTOGRAPHY & GIS CENTER / STATSGO DATA	1:250,000	01-01-1980
bea 37 ecological vegetation types	bitterroot grizzly bear analysis area ecological vegetation types from landsat imagery 50 meter pixels	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985
region 1 vegetation - NDVI Data	USFS Region 1 vegetation layer converted to vectors from landsat data with a 1135 meter pixel size and thinned to eliminate areas of 3 pixels and less (approximately 1.5 square miles) The original landsat imagery was obtained from the USFS Fire Experiment Station projected in Lambert Conic Conformal and then into UTM zone 12	07-23-1993	USDA Forest Service/R1 - Northern Region/MS	1135M pix	01-01-1993
Bitterroot NF ecological vegetation types	bitterroot grizzly bear analysis area ecological vegetation types from landsat imagery 50 meter pixels for the area encompassing most of the Bitterroot NF except for the eastern portion This map was created from the vegeco-grid and converted to vectors	09-30-1992	Clearwater National Forest - USDA Forest Service	50M pixel	07-19-1985

Coverage Title	Description	Date Created	Coverage Source	Source Map Scale	Source Map Date
Vegeatation Types of Idaho	Vegetation types for Idaho taken from Map of the Existing Vegetaion of Idaho by Steve Calcco, 1989 with a scale of 1:500,000 This coverage is stored in both UTM zone 12 and 11 (veg911).	01-01-1990	Idaho Cooperative Fish and Wildlife Research Unit - University of Idaho	1:500,000	05-01-1989
Distribution of Vertabrate Species in Idaho	Distribution of Vertabrate Species in Idaho. This coverage is stored in both zone 12 and 11 (verts11)	01-01-1990	Idaho Cooperative Fish and Wildlife Research Unit - University of Idaho		11-11-1900
Insect Detection of USFS Region 1	Polygon and point locations for Insect Infestations 1989 thru 1993. Scattered coverage before 1989. Digitized by FPM at 1:126720 or 1:100000 in Jelly. Can be exported to MOSS format.	Varied	USDA/Forest Service/R1 - Northern Region/Stipe		Varied

Appendix D: Sensitive Plants Important in Post-Fire Analysis

Allotropa virgata
Aquilegia brevistyla
Astragalus paysonii
Blechnum spicant
Botrychium spp.
(refer to R1 TES plant list)
Cardamine constancei
Carex californica
Carex hendersonii
Castilleja covilleana
Castilleja gracillima
Castilleja longispica
Clarkia rhomboidea
Cornus nuttallii
Cypripedium calceolus var. parviflorum
Cypripedium fasciculatum
Dasynotus daubenmirei
Elymus innovatus
Erigeron linearis
Eupatorium occidentale
Goodyera repens
Grindelia howellii
Halimolobos perplexa vars. lenhiensis and perplexa
Haplopappus carthamoides var. subsquarrosus
Haplopappus macronema var. macronema
Juncus hallii
Lesquerella carinata var. languida
Lesquerella sp. nov.
Lomatium geyeri
Lycopodium dendroideum
Lycopodium sitchense
Mentzelia pumila
Mertensia bella
Mimulus clivicola
Orogenia fusiformis
Oryzopsis contracta
Penstemon lemhiensis
Phlox kelseyi var. missoulensis
Pinus flexilis (North Dakota)
Polygonum douglasii ssp. austinae
Polypodium glycyrrhiza
Polystichum braunii
Populus balsamifera ssp. trichocarpa
Populus x acuminata
Rubus bartonianus
Rubus pubescens
Rubus spectabilis
Sanicula marilandica
Streptopus Streptopoides var. brevipes
Synthyris platycarpa
Tellima grandiflora
Thelypteris nevadensis
Thelypteris phegopteris
Trientalis latifolia
Trifolium eriocephalum
Trifolium gymnocarpon
Veratrum californicum
Waldsteinia idahoensis

Appendix E: Priority Geographic Areas Based on Forest Health Considerations

From a forest health perspective a team consisting of Barry Bollenbacher, Tom Rhode, Fred Samson, Ed Monnig and Jed Dewey (review) completed the definition of criteria (Table E-1) and assigned a priority to each Geographic Area in Region One. The historical vegetation cover map of the Region developed by Jack Losensky for the time period around 1900 was used to assist the team with this exercise.

This map, and criteria can be used (and refined if need be) to assist in a broad scale analysis related to Forest Health Initiative or Wildfire response efforts.

This is a first draft and could be improved with more detail such as listing those Geographic Areas with white bark pine or aspen types that have serious problems. Most Geographic Areas listed as 4 or 5, have some opportunities to have smaller amounts of priority 1, 2 or 3 conditions in localized areas.

These Geographic Areas delineations where made by the Forest Supervisors and Rangers this past Spring. They may be used in some way in the process of revising Forest Plans. They are areas that publics seem so identify with and use in some way differently than another area. Additionally, some ecological criteria were used to determine the boundary.

The following gives a sense of relative priority for vegetative treatments in relation to Forest Health considerations outside of burned areas.

TABLE E-1: CRITERIA FOR SELECTION OF A PRIORITY FOR GEOGRAPHIC AREAS IN REGION ONE, TO ADDRESS TERRESTRIAL VEGETATION TREATMENT PROPOSALS

PRIORITY	CRITERIA
1	These Geographic Areas, having a sense of place that the public identifies with, have the highest priority for treatment of terrestrial vegetation based on the following factors: Historically contained a fairly high percent of ponderosa pine or in areas that ponderosa does not occur, has contained a high percent of Douglas-fir forest type that was maintained in a fairly open grown park-like condition by a fire regime dominated by understory,(non-lethal) burning with some lethal or stand replacement regime. The structure of these forest types are likely outside the range of the historical, being more likely a multi-story, closed forest, rather than a more open park like forest community.; These areas also contain significant wildland-urban interface situations.
2	These Geographic Areas, having a sense of place that the public identifies with, have the next highest priority for treatment of terrestrial vegetation based on the following factor: These areas contain significant wildland-urban interface situations, but do not contain the amount of ponderosa or Douglas-fir types as in the priority one areas.
3	These Geographic Areas, having a sense of place that the public identifies with, have the next highest priority for treatment of terrestrial vegetation based on the following factors: Historically contained a fairly high percent of ponderosa pine or in areas that ponderosa does not occur, has contained a high percent of Douglas-fir forest type that was maintained in a fairly open grown park-like condition by a fire regime dominated by understory,(non-lethal) burning with some lethal or stand replacement regime. The structure of these forest types are likely outside the range of the historical, being more likely a multi-story, closed forest, rather than a more open park like forest community.; These areas do not contain significant wildland-urban interface situations.
4	These Geographic Areas, having a sense of place that the public identifies with, have the next highest priority for treatment of terrestrial vegetation based on the following factors: Historically contained a fairly high percent of western white pine type that has been significantly impacted by a combination of mountain pine beetle and white pine blister rust. These areas have significant departures from historical composition leading to serious forest health problems. These areas do not contain significant wildland-urban interface situations.
5	These Geographic Areas, having a sense of place that the public identifies with, have the next priority for treatment of terrestrial vegetation based on the following factors: forest types and structures are close to the historical composition and structure. These areas do not contain significant wildland-urban interface situations.

FIGURE E-1

Northern Region Geographic Areas

APPENDIX F

FIRES BY NAME, ACRES, AND SIZE CLASS FOR REGION ONE

Size class definitions:

Size Class	Acres
A	0 - 0.25
B	0.26 - 9.99
C	10.00 - 99.99
D	100.00 - 299.99
E	300.00 - 999.99
F	1000.00 - 4999.99
G	5000.00+

All fires listed in the Oracle database
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Closest Forest	Fire name	Acres	Size Class
02	Abrams Fire	.10	A
	Axolotl Lake	.10	A
	Baker Canyon	.20	A
	Barricade Fire	.10	A
	Bath House Creek	.10	A
	Bingo Fire	.10	A
	Bird Dog Fire	.10	A
	Bivens Creek 1	.10	A
	Bloody Dick Creek	.10	A
	Blue Ice	.10	A
	Blue Sedan	.10	A
	Booth Fire	.10	A
	Boyscout Flat	.10	A
	Browns Lake	.10	A
	Bubble Fire	.20	A
	Buck Ridge	.20	A
	Buckhorn	.10	A
	Cloak	.10	A
	Corndog	.10	A
	Coyote Hill	.10	A
	Craver Creek	.10	A
	Crazy Woman	.10	A
	Curlew Creek	.10	A
	Dean Creek	.10	A
	Decker Fire	.10	A
	Deer Mountain	.10	A
	Deer Peak	.20	A
	Devils Lane	.10	A
	Dixon Mountain	.10	A
	East Schultz	.10	A
	Elk Creek	.10	A
	Emerine Ridge	.10	A
	Ferguson Lake	.20	A
	Fisherman	.10	A
	Fred Burr	.10	A
	French Creek	.10	A
	French Gulch 2	.10	A
	Garr Canyon	.20	A
	Goldflint	.10	A
	Gut Pile	.10	A
	Harrison Lake	.10	A
	Hidden Hand	.10	A
	Hilltop Badger	.10	A
	Hilltop Fire	.10	A
	Indian Rock	.10	A
	Johnson Cabin	.10	A
	Mccloskey Brim	.10	A
	Microwave	.10	A

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Closest Forest	Fire name	Acres	Size Class
02	Middle Sheep	.10	A
	Nicholia Creek	.10	A
	O'Neil Creek	.10	A
	Perry Fire	.10	A
	Potato Patch	.10	A
	Powerline Fire	.10	A
	Race Track	.10	A
	Rainbow Lake	.10	A
	Roberts Gulch	.20	A
	Royo Basin	.10	A
	Secret Lake	.10	A
	South Meadow	.20	A
	Squaw Mountain	.10	A
	St. Elmos	.10	A
	Stoney Lake	.10	A
	Storm Peak	.10	A
	Sunshine	.10	A
	Tamarack	.10	A
	Thompson Park	.10	A
	Timmer Jim	.20	A
	Trapper Creek	.10	A
	Trusty Rider	.10	A
	U-Line Saddle	.20	A
	Willow	.20	A
	Antelope Peak 2	5.00	B
	Basin Creek	.30	B
	Billings Creek	5.00	B
	Bowles Creek	2.00	B
	Broken Truck	.30	B
	Conklin Lake	.70	B
	Crystal Lake	.50	B
	Dome Mountain	1.00	B
	Down Under	.30	B
	Gillespie Basin	1.00	B
	Gold Butte	.30	B
	Haypress	1.00	B
	Holdover	.30	B
	Humbug	3.00	B
	Lockhart Ridge	.30	B
	Lone Peak	1.00	B
	Lovers Leap	4.00	B
	Lower Willow	3.00	B
	Mussigbrod	2.00	B
	North Dearborn	8.00	B
	Pallisade	.50	B
	Pipestone	.30	B
	Railroad	5.00	B
	Renegade	.30	B

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Closest Forest	Fire name	Acres	Size Class
02	Running Bear	.30	B
	Sugarloaf	3.00	B
	Williams Creek	1.00	B
	Wilson Ridge	.50	B
	Antelope Peak 1	60.00	C
	Cherry Creek	10.00	C
	Ellis Peak	25.00	C
	Harkness Lake	42.00	C
	White Rock	50.00	C
	Badger Pass	250.00	D
	Red Mountain	150.00	D
	Hamilton Ranch	500.00	E
	Norris	500.00	E
	Lasich Fire	1,500.00	F
	Snowcrest/Robb	1,000.00	F
03	Alta	.10	A
	Archer	.10	A
	Aura Sequill	.10	A
	Bad Luck Creek	.10	A
	Baldtop	.10	A
	Balsam 2	.10	A
	Banana Fire?	.10	A
	Basin	.25	A
	Basin Creek	.10	A
	Benchmark	.10	A
	Black Tail	.10	A
	Bob	.10	A
	Boulder Point	.10	A
	Burnt Fork Lake	.10	A
	Camo Camp	.10	A
	Canyon Creek	.10	A
	Carry Fire	.10	A
	Castle Creek	.10	A
	Castle Rock	.10	A
	Cat	.25	A
	Cathouse	.25	A
	Chaffin Ridge	.10	A
	Charity	.10	A
	Charles Waters	.10	A
	Chicken Creek	.10	A
	Christmas Tree	.10	A
	Cold Springs	.10	A
	Como Corner	.10	A
	Como Park	.10	A
	Cooney Rdg	.10	A
	Coop 10	.10	A
	Corner Creek	.10	A

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Closest Forest	Fire name	Acres	Size Class
03	Corner Ridge	.25	A
	Couldn'T Read	.25	A
	Couldn'T Read2	.10	A
	Coyote	.25	A
	Coyote 2	.10	A
	Daly	.10	A
	Dam Lake	.25	A
	David	.25	A
	Deer Hollow	.10	A
	Deer Woods	.25	A
	Dense 2	.10	A
	Dense Creek	.10	A
	Devil Creek	.10	A
	Ditch Creek	.25	A
	Divide	.10	A
	Dixon	.10	A
	Dowling	.10	A
	Eagle Creek	.10	A
	Elephant Rock	.10	A
	Elk Creek	.25	A
	Elk Point Road	.20	A
	Ellen	.10	A
	Estey	.10	A
	Fale'S Trail	.10	A
	Falis Trail High	.10	A
	Falls 2	.10	A
	Flat Rock	.10	A
	Flat Rock #2	.10	A
	Fork Creek	.10	A
	Foxy	.10	A
	Gabe Creek	.25	A
	Gird 1	.20	A
	Gird 2	.20	A
	Gird 3	.10	A
	Green Mountain	.10	A
	Grouse	.25	A
	Hack Site	.10	A
	Heart	.10	A
	Hiatt	.10	A
	Hope Lake	.10	A
	Horsejaw	.10	A
	Hot Springs	.10	A
	Indian Creek	.10	A
	Indian Ridge Trail	.10	A
	Jack	.10	A
	Jack Creek	.25	A
	Jerry Fire	.10	A
	Jim	.10	A

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Closest Forest	Fire name	Acres	Size Class
03	Kerlee	.20	A
	Km Fire	.10	A
	Lairdon	.10	A
	Last Log	.10	A
	Little Blue	.10	A
	Little Boulder	.10	A
	Lookout Creek	.10	A
	Lookout Tree	.10	A
	Lower Face	.10	A
	Lowman	.10	A
	Lygia	.10	A
	Martin	.25	A
	Medicine	.10	A
	Mine	.25	A
	Moon	.10	A
	Mt. Aura	.10	A
	Mt. Aura Trail 2	.10	A
	Mt. Paloma	.10	A
	National	.10	A
	New Fire	.25	A
	Nezcastle	.10	A
	North Fork	.10	A
	North Mount George	.10	A
	Oh Creek	.10	A
	One Tooth	.25	A
	Orphan	.10	A
	Paint	.10	A
	Palisade	.25	A
	Palisade #1	.10	A
	Palisade #2	.10	A
	Paloma Creek	.10	A
	Pass	.10	A
	Peach	.10	A
	Picnic Area	.10	A
	Pine Knot	.10	A
	Porky	.10	A
	Quartzite Mountain	.10	A
	Railroad	.10	A
	Reimel	.10	A
	Ridge Fire?	.10	A
	Risa	.10	A
	Rocky Knob	.25	A
	Rombo Mountain	.10	A
	Rooster	.25	A
	Salt Creek	.10	A
	Schofield	.10	A
	School Point	.10	A
	Shadow	.10	A

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03	Sheep Creek	.10	A
	Shining Mountain	.10	A
	Silvi	.10	A
	Skalkaho Face	.10	A
	Skalkaho Pass	.25	A
	Smoke	.10	A
	Smoke 2	.10	A
	St. Gird	.25	A
	Steep Hill	.10	A
	Sun	.20	A
	Swift Creek	.10	A
	Taber	.10	A
	Tepee	.10	A
	Tie Chute	.10	A
	Tin Cup	.10	A
	Tin Cup Ridge	.10	A
	Took Creek Saddle	.10	A
	Transformer	.10	A
	Trout Creek	.10	A
	Twin Lakes	.10	A
	Vance	.10	A
	Verry Fire	.10	A
	Wapiti Creek	.10	A
	Wheeler/Ward	.10	A
	White	.20	A
	Woods Creek	.10	A
	Antler Creek	7.00	B
	At 2	.50	B
	Bear	.50	B
	Bet	1.50	B
	Camp	.50	B
	Cayuse Creek	.50	B
	Fall Creek	1.00	B
	Falls	.80	B
	Gird	.50	B
	Haystack	3.00	B
	Indian Trail	.33	B
	Koch Mountain	2.50	B
	Kootenai Ridge	.50	B
	Little Blue Joint	1.00	B
	Lookout Mountain	.50	B
	Lost	1.00	B
	Massacre	.50	B
	Mt. Aura Trail	.50	B
	Piquett Creek	.50	B
	Schofielld Head	.50	B
	South Kootenai	.50	B
	St. Clair	1.00	B

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03	Stone	.50	B
	Trapper Trail	.75	B
	Triple Creek	6.00	B
	Cold Springs	15.00	C
	Sage Brush	15.00	C
	Sawtooth	10.00	C
	Wood Hump	80.00	C
	Buffalo Jump	550.00	E
	Magruder Ridge	1,109.00	F
04	1965 Road	.25	A
	20 Mile Stump	.25	A
	22 Stumps	.25	A
	49 Meadows	.25	A
	87 1/2 Miles	.25	A
	Aconite	.25	A
	Adams 7	.25	A
	Alder Kid	.25	A
	Allens Gulch	.25	A
	Annis Creek	.25	A
	Arbe Sec 18	.10	A
	Bad Joke	.25	A
	Bald Fire	.25	A
	Barren Hill	.25	A
	Bear Creek	.25	A
	Bear Creek	.25	A
	Bear Creek	.25	A
	Bear Creek	.25	A
	Bear Divide	.25	A
	Beargrass	.25	A
	Bearskull	.25	A
	Bearskull 27	.25	A
	Beaver Creek 16	.25	A
	Benning Mountain	.25	A
	Berge Creek	.25	A
	Big Baldy	.25	A
	Big Sky	.25	A
	Black Gold	.25	A
	Black Jack 33	.25	A
	Black Peak	.25	A
	Black Top Mountain	.25	A
	Blackbear	.25	A
	Blacklake Resort	.25	A
	Blacktail	.25	A
	Blacktail Mountain	.25	A
	Blazing Saddles	.25	A
	Blue Creek Ridge	.25	A
	Bluff 26	.25	A

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04	Bluff 33	.25	A
	Bluff Camp	.25	A
	Bluff Divide 32	.25	A
	Bob Cattle 2	.25	A
	Bobaloo	.25	A
	Bobtail	.25	A
	Bog Creek	.25	A
	Boise Peak 5	.25	A
	Bond Lake	.25	A
	Bondus	.25	A
	Bone Sister	.25	A
	Bonehead	.25	A
	Bonehead 2	.25	A
	Boulder Creek	.25	A
	Boulder Divide	.25	A
	Boulder Divide 2	.25	A
	Brand New	.25	A
	Braun Creek	.25	A
	Breezy Point	.25	A
	Brood Ax	.25	A
	Browns Saddle	.25	A
	Bruin #11	.25	A
	Bruin #35	.25	A
	Bruin 3	.25	A
	Brushhill #5	.25	A
	Buck Light	.25	A
	Buckskin	.25	A
	Bull Run 2	.25	A
	Bullion Border	.25	A
	Burshy	.25	A
	Burton Peak	.25	A
	Bussell Peak 1	.25	A
	Bussell Peak 2	.25	A
	Bussell Peak 3	.25	A
	Butch Lucky	.25	A
	Butte	.25	A
	Calder Peak	.25	A
	Calder Trail	.25	A
	Camel Back	.25	A
	Camp 44	.25	A
	Camp Creek #2	.10	A
	Caribou Flats	.25	A
	Cataract	.25	A
	Cedar Spots	.25	A
	Child'S Creek	.25	A
	Clearcut	.25	A
	Cochran Fork	.25	A
	Coddington #2	.25	A

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04	Coddington #3	.25	A
	Coddington #4	.25	A
	Coddington #5	.25	A
	Coddington #6	.25	A
	Coddington #7	.25	A
	Coddington(1)	.25	A
	Cooks Road Fire	.25	A
	Cornwall	.25	A
	Cougar Creek	.25	A
	Cougar Den	.25	A
	Crescendo Creek	.25	A
	Cresendo #1	.25	A
	Cresendo #2	.25	A
	Cresendo #3	.25	A
	Crow Lake	.25	A
	Cruddy Road	.25	A
	Cuban Hill	.25	A
	Daviego	.25	A
	Dec	.25	A
	Declration Creek	.25	A
	Delyle Ridge	.25	A
	Desmet	.25	A
	Devil'S Butt	.25	A
	Devil'S Lake Upper	.25	A
	Digbee	.25	A
	Dip Creek 19	.25	A
	Dip Stick	.25	A
	Distillary Bay	.25	A
	Dolly Creek	.25	A
	Dominian Peak #2	.25	A
	Dominion Small	.25	A
	Don'S Mountain	.25	A
	Donkey Creek	.25	A
	Downy Creek	.25	A
	Dry Can	.25	A
	Duplex 2	.25	A
	Duplex Creek	.25	A
	Duram #19	.25	A
	Dusty Creek	.25	A
	Eagle Point	.25	A
	East Cathedral	.25	A
	East Dennis	.25	A
	East For Brush	.25	A
	East Fork Bluff	.25	A
	East Fork Bluff 4	.25	A
	East Fork Gold	.25	A
	East Gap	.25	A
	East Hayden	.25	A

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04	East Pocono #2	.25	A
	Eaton Creek	.25	A
	Engstrom	.25	A
	Erickson	.25	A
	Evergreen Mountain	.25	A
	Ewast Pocono #1	.25	A
	Falvey	.25	A
	Fan Creek	.25	A
	Fearn Fire	.25	A
	Fighting Creek	.25	A
	Fishhook 5	.25	A
	Fishook Creek	.25	A
	Five Finger	.25	A
	Flat	.25	A
	Flat Creek Saddle	.25	A
	Flat Iron Knob	.25	A
	Flat Tire	.25	A
	Flat Too	.25	A
	Flat Top Mountain	.25	A
	Flemming	.25	A
	Fly Peak	.25	A
	Forage Creek	.25	A
	Fraziers Saddle	.25	A
	Freeze Out Ridge	.25	A
	French Lake	.25	A
	Fuzzy Sky	.25	A
	Gaila	.25	A
	Garfield Bay Rd	.25	A
	Goat Creek	.25	A
	Goat Mountain	.25	A
	Gold Bond	.25	A
	Gold Peak	.25	A
	Gold Two	.25	A
	Golden Rot	.25	A
	Goose Point	.25	A
	Graham Campsite	.25	A
	Graham Flat	.25	A
	Grandmother	.25	A
	Granite Peak	.25	A
	Granite Pile	.25	A
	Grassy	.25	A
	Grassy Top	.25	A
	Graves Creek	.25	A
	Gray Gulch	.25	A
	Guard Draw	.25	A
	Halfway Peak	.25	A
	Halsey	.25	A
	Ham Creek	.25	A

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04	Hanna Flats	.25	A
	Harlo Point	.25	A
	Harrison Trail	.25	A
	Head Of Goat	.25	A
	Hemlock Loop	.25	A
	Heyburn Park	.25	A
	Hidden Highway	.25	A
	Hidden Knoll	.25	A
	High Lakes	.25	A
	Hill 36	.25	A
	Hill Billy	.25	A
	Hilo	.25	A
	Holmstead	.25	A
	Honey	.25	A
	Hot Plumb	.25	A
	Howies	.25	A
	Huckelberry	.25	A
	Hughes	.25	A
	Hugus Creek	.25	A
	I Dream Of Jeannie	.25	A
	Incline 1	.25	A
	Incline 2	.25	A
	Independence	.25	A
	Indian Cliff	.25	A
	Indian Peak	.25	A
	Indian Peak #1	.25	A
	Italian	.25	A
	Jackson Knob	.25	A
	Jackson Knob 2	.25	A
	Jeru	.25	A
	Jill'S Bog	.25	A
	Jim Creek	.25	A
	Jim Spur	.25	A
	Jim Spur #2	.25	A
	Joe	.25	A
	Johns Peak	.25	A
	Joker Road 19	.25	A
	Jokes On Us	.25	A
	Jorden Creek	.25	A
	Jorden Springs	.25	A
	Junction Again	.25	A
	Kelly Creek	.25	A
	Keokee	.25	A
	Kienbaum	.25	A
	Killingsworth	.10	A
	Kitty Creek	.25	A
	Knowledge	.25	A
	Kootenai Peak	.25	A

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04	Krieger Creek	.25	A
	Lake Elsie	.25	A
	Lakeshore Drive	.25	A
	Land O' Lakes	.25	A
	Last One	.25	A
	Late For Supper	.25	A
	Latour South	.25	A
	Layover	.25	A
	Ledge Creek	.25	A
	Ledge Too	.25	A
	Lime Creek	.25	A
	Lindsey Mountain	.25	A
	Line Creek	.25	A
	Lion Smith	.25	A
	Little Duff	.25	A
	Little Elk	.25	A
	Little Joe	.25	A
	Lolo Pass	.25	A
	Lone Hike Creek	.25	A
	Long Hike Rock	.25	A
	Long Plummer	.25	A
	Looking Toot	.25	A
	Lookout	.25	A
	Lost Skillet	.10	A
	Lost Sunset	.25	A
	Lower Cochran	.25	A
	Lower Farnham	.25	A
	Lower Malemute	.25	A
	Lower Suburban	.25	A
	Lower Suburban-2	.25	A
	Lunch Junction	.25	A
	Lunch Spot	.25	A
	Macdougal	.25	A
	Manley Creek	.25	A
	Mann Creek	.25	A
	Maple Peak	.25	A
	Marie Saddle	.25	A
	Marker 36	.25	A
	Martin 24	.25	A
	Mcginty Plus	.25	A
	Mellicks Marage	.25	A
	Mid Slope	.25	A
	Middle Sister	.25	A
	Miner'S Creek	.25	A
	Mollies West	.25	A
	Montana 15	.25	A
	Montana 9	.25	A
	Montana Creek	.25	A

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04	Montana Peak	.25	A
	Moose Creek	.25	A
	Mountain Couer D'Lene	.25	A
	Mowich	.25	A
	Mud Lake	.25	A
	Mule Creek	.10	A
	Mullan Tree	.25	A
	Murry Peak	.25	A
	Myrtle'S Head	.25	A
	N.P. Hill	.25	A
	New Fire	.25	A
	No Joke	.25	A
	North Dec	.25	A
	North Haystack	.25	A
	North Side	.25	A
	Norton #2	.25	A
	Norton Creek	.25	A
	Noseeum 270	.25	A
	Nubbinz	.25	A
	Nugget Hill	.25	A
	Nugget Ridge	.25	A
	Nugget South	.25	A
	Oc-7	.25	A
	Old Trapper	.25	A
	Omaha Creek	.25	A
	Orphan Junction	.25	A
	Orphan Pt	.25	A
	Other Half	.25	A
	Pablo Scoot	.25	A
	Pack Rat	.25	A
	Pack Sack Point	.25	A
	Packer Meadows	.25	A
	Packsaddle Ridge	.25	A
	Papoose Creek	.25	A
	Parsnip 4874	.10	A
	Peg Leg	.25	A
	Pelke Two	.25	A
	Penn Gulch	.25	A
	Periwinkle	.25	A
	Persistance	.25	A
	Picnic	.25	A
	Picnic Creek	.25	A
	Pineapple	.25	A
	Pineapple Trail	.25	A
	Pitchfork 18	.25	A
	Pocono #1	.25	A
	Pocono #2	.25	A
	Pocono #3	.25	A

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04	Pocono Hill	.25	A
	Pocono Hill A	.25	A
	Pollard Creek	.25	A
	Pond Peak	.25	A
	Porcupine	.25	A
	Powderhorn	.25	A
	Prichard Peak	.25	A
	Prospector 2	.25	A
	Prospector 8 Mile	.25	A
	Pyramid	.25	A
	Quartz #30	.25	A
	Quartz Ridge	.25	A
	Queen Lake	.25	A
	Red Raven	.25	A
	Reeder Mountain	.25	A
	Retoot	.25	A
	Road 265	.25	A
	Rod'S Tree	.25	A
	Round Top	.25	A
	Roundtop	.25	A
	Ruby #2	.25	A
	Ruby #3	.25	A
	Ruby #4	.25	A
	Ruby Ridge	.25	A
	Russell Trail	.25	A
	Rusty	.25	A
	Rusty Fire	.25	A
	Sawmill Gulch	.25	A
	Sawtooth #13	.25	A
	Sawtooth #22	.25	A
	Sawtooth #24	.25	A
	Scat Creek	.25	A
	Schweitzer Knob	.25	A
	Screaming Sam	.25	A
	Search Lake	.25	A
	Second Fedco	.25	A
	Service Ccreek	.25	A
	Shale Point	.25	A
	Shefoot	.25	A
	Sherlock Peak	.25	A
	Sherwin Williams	.25	A
	Shoshone Park	.25	A
	Silver Creek	.25	A
	Sisters Creek	.25	A
	Siwash	.25	A
	Sleepy	.25	A
	Sluce Creek	.25	A
	Sly Meadows	.25	A

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Closest Forest	Fire name	Acres	Size Class
04	Smith North	.25	A
	Smith South	.25	A
	Smrd	.25	A
	Snagrtwo	.25	A
	Snout Ridge	.25	A
	Snow Peak 19	.25	A
	Sob	.25	A
	Soloman Camp	.25	A
	Soloman Lake	.25	A
	Spades	.25	A
	Spinekop Creek	.25	A
	Spots	.25	A
	Spring Cabin	.25	A
	Spring Creek	.25	A
	Stacel 22	.25	A
	Stack Creek	.25	A
	Steamboat	.25	A
	Stony Point	.25	A
	Suburban 2	.25	A
	Sugarloaf	.25	A
	Swan Peak	.25	A
	Swan Peak #2	.25	A
	Tall Child	.25	A
	Tango	.25	A
	Tee-Break	.25	A
	Telephone Booth	.25	A
	Temple Mountain	.25	A
	Tepe Creek	.25	A
	The Slide	.25	A
	Thief	.25	A
	Threstle Ridge	.25	A
	Tolla Creek	.25	A
	Toot Creek	.25	A
	Toot Trail	.25	A
	Traffic	.25	A
	Trail 100	.25	A
	Trail 225	.25	A
	Trapper Trail	.25	A
	Tree	.25	A
	Tri-Smith	.25	A
	Truck Fire	.25	A
	Tumble Down	.25	A
	Turner Peak	.25	A
	Twin Lake	.25	A
	Two	.25	A
	Two Mouths	.25	A
	Tyler'S Ridge #2	.25	A
	Tyler'S Ridge #3	.25	A

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Closest Forest	Fire name	Acres	Size Class
04	Tylers Ridge	.25	A
	Upper Alpine	.25	A
	Upper Cornwall	.25	A
	Upper Davies	.25	A
	Upper Davies 2	.25	A
	Upper Malemute	.25	A
	Upper Pack	.25	A
	Upper River Road	.25	A
	Upper Smith Creek	.25	A
	Upper Spring #30	.25	A
	Upper Spring #31	.25	A
	Upper Surburban	.25	A
	Uranus Creek	.25	A
	Voodoo	.25	A
	Walo	.25	A
	Ward 23	.25	A
	Wawa Again	.25	A
	Wawa#12	.25	A
	Welcome Home	.25	A
	West Branch	.25	A
	West Gap	.25	A
	Whitetail 12	.25	A
	Whitetail Peak	.25	A
	Wigwam	.25	A
	Wisdom Peak	.25	A
	Wsl	.25	A
	Yellow Dog	.25	A
	Zadar #1	.25	A
	1st Crescendo	5.00	B
	20 Mile North	5.00	B
	2nd Cresendo	5.00	B
	Abandon Roost	5.00	B
	Abandon South	5.00	B
	Alpine	5.00	B
	Arrow	4.00	B
	Balsam	1.00	B
	Battery Creek	2.00	B
	Bean Hole	1.00	B
	Bear Creek	2.00	B
	Bear-O.S.R.	5.00	B
	Beaver Creek	5.00	B
	Beaver Ridge	2.00	B
	Berg 3	5.00	B
	Berg Mountain	3.00	B
	Berry Creek	5.00	B
	Big Creek	5.00	B
	Big Sister	5.00	B
	Bivouqe Creek	1.00	B

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Closest Forest	Fire name	Acres	Size Class
04	Black Peak 2	5.00	B
	Blackjack Cr	5.00	B
	Bob Cattle 1	5.00	B
	Bogus 2	5.00	B
	Bogus Point	5.00	B
	Boise Peak 1	5.00	B
	Boise Peak 2	5.00	B
	Boise Peak 3	5.00	B
	Boise Peak 4	5.00	B
	Bond Creek	5.00	B
	Bottom	1.00	B
	Brushy Ridge	5.00	B
	Canida Peak	5.00	B
	Casper Creek	5.00	B
	Center 20 Mile	5.00	B
	Childs Creek	5.00	B
	Chimney Fire	5.00	B
	Circus Peak	2.00	B
	Condon Mountain	2.00	B
	Cougar Creek	5.00	B
	Cove Mountain	1.20	B
	Dawson	5.00	B
	Day Rock	5.00	B
	Devil'S Lake Lower	5.00	B
	Diamond Ranch	5.00	B
	Dominian Peak 1	5.00	B
	Dominion Big	5.00	B
	Double	1.50	B
	Drexal Springs	5.00	B
	Drexey	5.00	B
	Duram 20	5.00	B
	East Cotton	5.00	B
	East Fork	1.25	B
	East Fork	5.00	B
	Evergreen 2	5.00	B
	Falls Point	2.00	B
	Fire Camp Saddle	1.00	B
	Fishhook 1	5.00	B
	Fishhook 2	5.00	B
	Flume Creek	5.00	B
	Fritz 26	5.00	B
	Glacier	1.00	B
	Gold Creek	2.00	B
	Gold Creek	5.00	B
	Gold Creek 2	1.50	B
	Gold Hill	5.00	B
	Gold Ridge	5.00	B
	Gold Spots	5.00	B

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Closest Forest	Fire name	Acres	Size Class
04	Gorden Creek	5.00	B
	Granite	2.10	B
	Grass Gulch	3.00	B
	Green Mountain	5.00	B
	Griffen Creek	1.00	B
	Hamilton 2	5.00	B
	Hardy Gulch	5.00	B
	Harrison Ridge	5.00	B
	Haystack	3.00	B
	Helluva Hike	5.00	B
	Hidden Creek	5.00	B
	Hills Outlet	5.00	B
	Horseshoe Peak	5.00	B
	Howard Road	5.00	B
	Huckleberryspring	5.00	B
	Hunt Creek	5.00	B
	Indián Dip	5.00	B
	Jeanette	3.00	B
	Joker Peak	5.00	B
	Joker Peak 2	5.00	B
	Junction Creek	5.00	B
	Junkyard	5.00	B
	Kelly Loop	5.00	B
	Knox	5.00	B
	Kootenai Trail	4.00	B
	Lakeview Trail	5.00	B
	Last Laugh	5.00	B
	Latour	5.00	B
	Le Beau	4.00	B
	Leonia Knob	5.00	B
	Little Mallard	1.50	B
	Lonsome	5.00	B
	Lookout Mountain	5.00	B
	Low Brushy	4.00	B
	Lower Falls	5.00	B
	Mar Falls	3.00	B
	Martin Creek 3	1.00	B
	Mcginnis Creek	3.00	B
	Mcginty	5.00	B
	Miller Peak	5.00	B
	Misery Ridge	5.00	B
	Moe	1.00	B
	Moose Creek	5.00	B
	Morton Slough	5.00	B
	Mounumenta Mountain	5.00	B
	My Creek	5.00	B
	My Creek Ridge	5.00	B
	My Creek Trail	5.00	B

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Closest Forest	Fire name	Acres	Size Class
04	N Breezy	5.00	B
	N.P. 31	5.00	B
	Needle Peak	5.00	B
	North Wall	5.00	B
	Oregon Butte Lake	3.00	B
	Pack Saddle	5.00	B
	Paradise	2.00	B
	Pelke Divide	5.00	B
	Pinacle Creek	5.00	B
	Porcupine	5.00	B
	Priest Lake	5.00	B
	Prospector 1	5.00	B
	Quartz Ridge Trail	5.00	B
	Railroad	5.00	B
	Rhonda 1	5.00	B
	Rock Creek	2.50	B
	Rocky Ridge	1.00	B
	Roland	5.00	B
	Ruby Point	5.00	B
	Russel	5.00	B
	Saddle Creek	5.00	B
	Schweitzer Creek	5.00	B
	Shedroof	5.00	B
	Short Stop	5.00	B
	Silent Knight	5.00	B
	Silver Dome 2	1.50	B
	Skalkaho	2.00	B
	Skyland Lake	5.00	B
	Smith Creek	4.00	B
	Solitaire East	5.00	B
	South Bluff	2.50	B
	South Trapper	5.00	B
	Steamboat Betty	5.00	B
	Tavern Creek	5.00	B
	Tensed	5.00	B
	Top Of The World	5.00	B
	Trout Creek	5.00	B
	Truman Creek	1.50	B
	Twin Creek	5.00	B
	Two	1.50	B
	Tyson Creek	5.00	B
	Upper 20 Mile	5.00	B
	Upper Falls	5.00	B
	Upper Wall	5.00	B
	Wall Peak	5.00	B
	Wastooth 22 1/2	5.00	B
	Watershed Ridge	5.00	B
	Wawa 2	5.00	B

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Closest Forest	Fire name	Acres	Size Class
04	Windy Bay	5.00	B
	Bailey Double	20.00	C
	Blackbone	50.00	C
	Blacktail	13.00	C
	Bond Lake	50.00	C
	Charlotte Peak 2	72.00	C
	Chute Cr	50.00	C
	Coolwater	50.00	C
	Crystal Lake	20.00	C
	Drake Saddle	10.00	C
	East Sister 13	50.00	C
	Falls Creek	16.00	C
	Gold Pan	55.00	C
	Halowat 2	35.00	C
	Larch Creek 1	50.00	C
	Lightning Mountain	50.00	C
	Martin Peak	50.00	C
	Murry 2	50.00	C
	Northwest Peak	99.00	C
	Olson Loop	50.00	C
	Pass Creek	99.00	C
	Red Ives Pk 25	50.00	C
	Rondo	50.00	C
	Saddle Mountain	65.00	C
	Saddler Creek	50.00	C
	Slip Slide	10.00	C
	South Hill #3	10.00	C
	South Lightning	50.00	C
	Strong Creek	50.00	C
	Thirtyfour Creek	50.00	C
	Thor 2	50.00	C
	Thor Mountain	50.00	C
	Trapper	20.00	C
	Trilobite Lakes	68.00	C
	Upper Cochrans	50.00	C
	Vanderpool	50.00	C
	Wall Creek	50.00	C
	1956 North	220.00	D
	Abandon Point	100.00	D
	Border	153.00	D
	Dodge Lake	256.00	D
	Green Saddle	132.00	D
	Lightning Creek N&S	275.00	D
	Montgomery Gulch	100.00	D
	Scotchman Peak	275.00	D
	Steep Creek	170.00	D
	Wahoo	168.00	D
	Fisher Peak	337.00	E

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Closest Forest	Fire name	Acres	Size Class
04	Lizard Peak	809.00	E
	Mankato Mountain	948.00	E
	Slide Creek	712.00	E
	Slim Ridge	740.00	E
	St. Joe Complex	700.00	E
	Trail	360.00	E
	Ann	2,890.00	F
	Dean Ridge	1,425.00	F
	Helen Creek	1,520.00	F
	Nick Creek	1,707.00	F
	Rhoda Point	1,589.00	F
	Little Wolf	15,230.00	G
05	Heslip Ridge	18.00	C
	Isabella	83.00	C
	Upper Minnesaka	65.00	C
	Cliff Creek	120.00	D
	Elk River	165.00	D
	Gold Meadows	264.00	D
	Hidden Fix	275.00	D
	Horsecamp	100.00	D
	Sam	125.00	D
	Bear Camp	510.00	E
	East Beaver	741.00	E
	Elmer Group Sec 5	320.00	E
	Elmer Group Sec 8	320.00	E
	Lizard Peak	846.00	E
	Sponge Mountain	536.00	E
	Big Sand	1,661.00	F
	Fern	2,515.00	F
	Hidden Creek	1,551.00	F
	Siam	1,700.00	F
	Freezeout	7,153.00	G
	Snake Complex	6,574.00	G
08	Froze To Death	.25	A
	Kerr	.25	A
	Lake Fork	.25	A
	Lodgepole Creek	.25	A
	Margarita	.25	A
	Meadowgold	.25	A
	Patriot	.25	A
	Picket Pin	.25	A
	Redwing	.25	A
	Slough Lake	.25	A
	Smith	.25	A
	Ash	5.00	B
	Ash Coulee	5.00	B

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Closest Forest	Fire name	Acres	Size Class
08	Black	5.00	B
	Blow	5.00	B
	Bull	5.00	B
	Butter	5.00	B
	Charley	5.00	B
	Cook	5.00	B
	Darling	5.00	B
	Eaton	5.00	B
	Flecher	5.00	B
	Foster Creek	5.00	B
	Fuzz	5.00	B
	Gergan	5.00	B
	Goat	5.00	B
	Heimer	5.00	B
	Jacobs	5.00	B
	Kutt	5.00	B
	Milton	5.00	B
	Molstad	5.00	B
	Morris	5.00	B
	Pasture 3b	5.00	B
	Pasture 8	5.00	B
	Poker	5.00	B
	Pope #2	5.00	B
	Private	5.00	B
	Shatener	5.00	B
	Stormy	5.00	B
	Sugar Run	5.00	B
	Taylor	5.00	B
	Timber	5.00	B
	Tobin	5.00	B
	Venlo I	5.00	B
	Wolfgram	5.00	B
	Zoo	5.00	B
	Abraxas South Branch	50.00	C
	Doubt	50.00	C
	Goodspeed	50.00	C
	Horse Creek East	50.00	C
	Ice Box Canyon	50.00	C
	Lemonade	50.00	C
	Little Knob	50.00	C
	Nutter	50.00	C
	Outyear	50.00	C
	Pasture 4b	50.00	C
	Pickle	50.00	C
	Pistal Pete	50.00	C
	Pope #1	50.00	C
	Wedding	50.00	C
	Wynnkoop	50.00	C

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Closest Forest	Fire name	Acres	Size Class
08	Yager	50.00	C
	Halbert	150.00	D
	Home Creek	150.00	D
	J. Flow	150.00	D
	Lone Moutnain	150.00	D
	Rocket	150.00	D
	Slick	150.00	D
	Black Butte	500.00	E
	Chezum	550.00	E
	Corson County	2,500.00	F
	Dry Head	1,000.00	F
0E	Foehl 16	.25	A
10	1962 Exhibit	.25	A
	9 Mile Loop	.10	A
	Alcorn	.20	A
	Baptiste	.10	A
	Beach	.10	A
	Blacktail East	.10	A
	Boise Peak 2	.25	A
	Broken Leg	.10	A
	Bullet Nose	.10	A
	Clorinda Loop	.20	A
	Con Kelley	.10	A
	Crane 10212-1	.10	A
	Crane 10212-2	.10	A
	Crane Mile Marker #1	.10	A
	Crane Mountain	.10	A
	Crane Mountain 2	.10	A
	Depuy	.10	A
	Desert Mountain	.10	A
	Dog Creek	.10	A
	Ducharme Lake	.10	A
	Emery Bay Campground	.10	A
	Flossy Creek	.25	A
	Foxy	.20	A
	Goat Creek	.25	A
	Griffen Creek North	.20	A
	Halowat	.10	A
	Halowat 3	.25	A
	Hand Creek	.20	A
	Handkerchief Lake	.25	A
	Hornet	.10	A
	Jimmy Ridge 1	.25	A
	Jimmy Ridge 2	.10	A
	Langford	.10	A
	Langford 2	.10	A

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Closest Forest	Fire name	Acres	Size Class
10	Lawrence Airstrip	.10	A
	Lion Creek	.10	A
	Little Salmon	.10	A
	Martin Creek	.10	A
	Masonary Peak	.10	A
	Moose Creek	.10	A
	Moose Peak	.25	A
	Nasukoin	.20	A
	Nicola	.25	A
	North Fork Cedar Creek	.10	A
	Nyack Flats	.10	A
	Old Hungry Horse Campground	.25	A
	Otter Creek	.25	A
	Paola	.10	A
	Pendant 2	.10	A
	Pioneer Trail	.25	A
	Piper Crow Pass	.10	A
	Red Meadow	.10	A
	Round Meadow	.10	A
	Sandstone	.10	A
	Schmidt Creek	.10	A
	Shaw Creek	.10	A
	Skiumah Trail	.10	A
	Slim Trail	.20	A
	Spruce Creek	.10	A
	Standard Peak	.10	A
	Star Meadows	.10	A
	Stone House	.10	A
	Teakettle	.10	A
	Tepee	.10	A
	Tie	.10	A
	West Coal	.10	A
	Wickiup	.25	A
	Winona Ridge	.10	A
	Yew Creek	.10	A
	Deep Creek	.50	B
	Firefighter	.50	B
	Flat Creek	.50	B
	Kimmerly Creek	.30	B
	Margaret Lake	.50	B
	Martin 4	3.00	B
	Mid Creek	.50	B
	Musky-Griffen	1.00	B
	Scarface	3.00	B
	Bruin	30.00	C
	Mid Creek 2	10.00	C
	Pivot Mountain	72.00	C

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Closest Forest	Fire name	Acres	Size Class
10	Lost Trail	1,166.00	F
	Niarada	4,268.00	F
	Mcdonald	8,000.00	G
11	W. White Beaver Creek	600.00	E
	Deckard Flats	2,100.00	F
	Robinson	4,300.00	F
	Smith Creek	1,500.00	F
	Black Butte	12,100.00	G
12	American Gulch	.25	A
	Basin	.25	A
	Beaver Creek	.25	A
	Black Sandy	.25	A
	Blair	.25	A
	Blick Fire	.25	A
	Boles	.25	A
	Brown Gulch	.25	A
	Bull	.25	A
	Candle	.25	A
	Celler	.25	A
	Cooper Creek	.25	A
	Dead Wood	.25	A
	Dry Creek	.25	A
	Duck Creek	.25	A
	Dutchman	.25	A
	Favorite	.25	A
	Fire Ring	.25	A
	Flecher	.25	A
	Gleason	.25	A
	Grizzly Gulch	.25	A
	Hauser Dam	.25	A
	Hedges Mountain	.25	A
	Hogum	.25	A
	Hollow	.25	A
	Jim Town	.25	A
	Johnny Gulch	.25	A
	Larbee Gulch	.25	A
	Lincoln Gulch	.25	A
	Lookout	.25	A
	Lovely Gulch	.25	A
	Mac Pass	.25	A
	Nelson Creek	.25	A
	Nevada Mountain	.25	A
	Porcupine	.25	A
	Quartz	.25	A
	Red Mountain	.25	A
	Rimini	.25	A

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Closest Forest	Fire name	Acres	Size Class
12	Sall	.25	A
	Sand Dam	.25	A
	Snow Crest	.25	A
	Snowbank	.25	A
	Soup Creek	.25	A
	Stemple	.25	A
	Stonewall	.25	A
	Stonewall #2	.25	A
	Strawberry	.25	A
	Toston Dam 1	.25	A
	Toston Dam 2	.25	A
	Two Hike	.25	A
	Unionville	.25	A
	Vigilante	.25	A
	Warm Srings Creek	.25	A
	Washout	.25	A
	Weasel Creek	.25	A
	Baldy	5.00	B
	Breaker	3.00	B
	Gate Of Mountain	5.00	B
	Ski Hi	2.00	B
	Swede Gulch	5.00	B
	Arasta	10.00	C
	Beartrap	15.00	C
14	17 Mile	.10	A
	3 Mile Creek	.10	A
	30 Mile Bull	.10	A
	4613 Road Fire	.10	A
	4613 Sour	.20	A
	58 Mile	.10	A
	5th Street Rr	.10	A
	65 Mile	.10	A
	69 Ranch 2	.10	A
	Advent	.10	A
	Advent #2	.10	A
	Arbo #1	.10	A
	Banefield #2	.10	A
	Banfield	.10	A
	Barnaby East	.10	A
	Barnaby West	.10	A
	Barren Blowdown	.10	A
	Barren Creek	.10	A
	Barron Peak	.10	A
	Bear Trap	.10	A
	Beetle Pete	.10	A
	Benning 2	.10	A
	Bettle Hill	.10	A

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Closest Forest	Fire name	Acres	Size Class
14	Big Johnson Road	.10	A
	Bigfoot	.10	A
	Blacktail	.10	A
	Blue Mountain	.10	A
	Blue Mountain #2	.10	A
	Bobtail	.10	A
	Boothman	.10	A
	Boulder Ghost	.10	A
	Bristow	.10	A
	Brush #2	.10	A
	Brush Mountain	.10	A
	Bubble Gumers	.10	A
	Cadette Creek	.10	A
	Caix Creek (Tamarack)	.10	A
	Calder Mountain	.10	A
	Cataract	.10	A
	Chlorine	.10	A
	Chuckies	.10	A
	Clarence	.10	A
	Clark Mountain	.10	A
	Clark Mountain #2	.10	A
	Clark Mountain #3	.20	A
	Colonite Fire	.10	A
	Coniff Sec 33 #2	.10	A
	Conklins	.10	A
	Conner Ridge	.10	A
	Corvell	.10	A
	Cow Flop	.10	A
	Davis Peak Ne	.10	A
	Davis Peak Ne #2	.10	A
	Davis Se #2	.10	A
	Deceive	.10	A
	Deer Creek Saddle	.10	A
	Devil'S Club	.10	A
	Dodge Summit	.10	A
	Doe Creek #1	.10	A
	Dooley	.10	A
	Dry Fork Creek	.10	A
	Eaton	.25	A
	Elk Creek	.10	A
	Elk Mountain	.10	A
	Elk North	.10	A
	Elk South #1	.10	A
	Elk South #2	.10	A
	Elk South #3	.10	A
	Elliot Creek	.10	A
	Falls Powerline	.20	A
	Fan Out	.10	A

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Closest Forest	Fire name	Acres	Size Class
14	Fisher 7.5	.10	A
	Fisher Mans	.10	A
	Fisher Mountain Top	.10	A
	Fix Ranch	.10	A
	Flat Creek Switchback	.10	A
	Fleetwood Mac	.10	A
	Flower Reservoir	.10	A
	Foothills	.10	A
	Fore	.10	A
	Frank Lake	.10	A
	Frank South	.10	A
	Freeman	.10	A
	Friday Hill	.20	A
	Friez Cat Creek	.10	A
	Garver #3	.10	A
	Garver Mountain	.10	A
	Garver Mountain #3	.10	A
	Garwin	.10	A
	Gin Creek	.10	A
	Glen Hill	.10	A
	Good Creek	.10	A
	Grambauer	.10	A
	Granite (Bear Creek)	.10	A
	Gravel Pit	.10	A
	Gunsight	.20	A
	Hamms	.10	A
	Harris 8	.10	A
	Harris Creek	.10	A
	Harvey #2	.10	A
	Haul Road	.20	A
	Head West Beuning	.10	A
	Hell Roaring	.10	A
	Hemlock	.10	A
	Hidden	.25	A
	Hornet Ridge	.10	A
	Horse Hill	.10	A
	Huckleberry	.10	A
	Huckleberry #2	.10	A
	Hunter Gulch	.10	A
	Iron Grouse	.10	A
	J.J. Solo	.10	A
	Jeressic Park	.10	A
	Jim Creek	.10	A
	Kavalla Powerline	.10	A
	Kellys	.10	A
	Kelsey Creek	.10	A
	Kilbrennan	.10	A
	Lafoe	.10	A

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Closest Forest	Fire name	Acres	Size Class
14	Lafoe	.10	A
	Lake Geneva 1	.10	A
	Lake Geneva 2	.25	A
	Larch Logging	.10	A
	Lick Mountain	.10	A
	Lightning Peak	.10	A
	Lime	.10	A
	Little Bit Noisy	.10	A
	Little Cherry Loop	.10	A
	Little Critton	.10	A
	Little Tom	.10	A
	Lockman	.10	A
	Long Meadows	.10	A
	Lost Shoe Fire	.10	A
	Lower Granite	.10	A
	Lower Ksanka	.10	A
	M&M	.10	A
	M.P. 60 #1	.10	A
	M.P. 60 #2	.10	A
	M.P. 60 #3	.10	A
	M.P. 61 #1	.10	A
	M.P. 61 #2	.10	A
	M.P. 61 #3	.10	A
	M.P. 61 #4	.10	A
	Magpie	.10	A
	Mantrap	.10	A
	Mcconnell	.10	A
	Mcrill	.20	A
	Mcswede	.10	A
	Meadow Creek	.10	A
	Meadow Creek South	.20	A
	Mile 7	.10	A
	Minor Lake	.10	A
	Moose Peak	.20	A
	Moose Peak #2	.25	A
	Moose/Calf	.10	A
	Mount Willard	.10	A
	Murphy	.10	A
	Murphy Overlook	.10	A
	Murphy Overlook 2	.10	A
	Murray Springs	.10	A
	Napoleon #2	.10	A
	Newton	.10	A
	Nixon Shed	.10	A
	No No No	.10	A
	Norman Mountain	.10	A
	North Dickey	.10	A
	North Parsnip	.10	A

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14	Noseeum	.10	A
	Old Soldier	.10	A
	Olson 22	.20	A
	Orr Gulch #2	.25	A
	Parsnip #2	.10	A
	Peace Creek	.10	A
	Porcupine	.10	A
	Porcupine Creek	.10	A
	Quartz #2	.10	A
	R.R. M.P. #44	.20	A
	Rainbow	.10	A
	Rainy 4750	.10	A
	Rainy Tub 2	.10	A
	Ransom Creek	.10	A
	Remps Pit	.10	A
	Rexford Water Tank	.10	A
	Ripley Campfire	.10	A
	Riverview #2	.10	A
	Robinson 2	.10	A
	Robinson Mountain	.10	A
	Rock Candy Mountain	.10	A
	Rock Ridge	.20	A
	Roosevelt	.10	A
	Rushlake	.10	A
	Samater #1	.10	A
	Samater #2	.10	A
	Savage	.10	A
	Scenery Mountain	.10	A
	Schreiber Creek #2	.10	A
	Sec 5 Dry Fork	.10	A
	Sergio'S Spot	.10	A
	Sewer	.10	A
	Sheepherder Ne	.10	A
	Skookum #2	.10	A
	Skookum #3	.10	A
	Skookum Creek	.10	A
	Skyline	.20	A
	Skyline #3	.10	A
	Snort Creek	.10	A
	So Fire 17	.10	A
	South Fork Bull	.25	A
	Spencer Fire	.10	A
	Spread Creek	.10	A
	Spring Creek	.10	A
	Stahl	.10	A
	Starling	.10	A
	Stein	.10	A
	Stone Chest	.10	A

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Closest Forest	Fire name	Acres	Size Class
14	Stone Hill	.10	A
	Sunshine Creek	.10	A
	Survey Mountain	.25	A
	Sushine Creek	.20	A
	Swamp	.10	A
	Swamp Aspen	.10	A
	Swampie Spot	.10	A
	T.P. Mike	.20	A
	Taylor Peak Road	.10	A
	Teepee Mountain	.10	A
	Tepee Lake	.25	A
	Thirsty	.10	A
	Three Strikes	.10	A
	Tony Peak	.10	A
	Trail #11	.10	A
	Trout Creek Trail	.10	A
	Tuff	.20	A
	Twin Creek	.10	A
	Upper Cherry Creek	.10	A
	Upper Little Wolf	.10	A
	W. Mcginnis Mountain	.10	A
	Wader Ridge	.10	A
	Wampoo	.20	A
	Warax #1	.10	A
	Warax #2	.10	A
	Water Hill Sec. 30	.10	A
	Weisel	.10	A
	West Fork Elk #2	.10	A
	West Side Ridge	.10	A
	Wicket Weasel	.10	A
	Williams Crek Powerline	.10	A
	Willow Pass	.25	A
	Wingar	.10	A
	Wolf Mountain	.10	A
	Yaak Train Fire	.10	A
	112 J	5.00	B
	4427	1.00	B
	6200 Road	.80	B
	69 Ranch	.30	B
	Agnew	.50	B
	Alexander	.30	B
	Alexander Mountain	.50	B
	Arbo #2	.50	B
	Asarco	3.00	B
	Backen Ranch	.50	B
	Black Lake Road	.30	B
	Bobtail Ridge	.50	B
	Cable Mountain	.50	B

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Closest Forest	Fire name	Acres	Size Class
14	Camp Creek 1	2.00	B
	Carrigan	.30	B
	China Creek	1.00	B
	Clay #2	.70	B
	Clay Banks	.50	B
	Clay Mountain	.80	B
	Clay/Flattao	3.00	B
	Cody Creek	.30	B
	Cole Creek	6.00	B
	Coniff Sec #33	.30	B
	Crazyman	.30	B
	Creek Of Willard	.30	B
	Davis	.50	B
	Doe Creek	1.00	B
	Dry Fork	.30	B
	Dunn	1.50	B
	East Fork	1.00	B
	East Side	2.00	B
	Edwards	5.00	B
	Eiliot 1	8.00	B
	Elliot #2	.30	B
	Fails Creek	1.00	B
	Faucet	1.50	B
	Fawn Creek	2.00	B
	Fosseum	.30	B
	Frog Lake	.30	B
	Goat Draw	4.00	B
	Goat Rocks/Ramsey	5.00	B
	Goodall	.50	B
	Grimes Gulch	.30	B
	Habo Mountain	5.00	B
	Haines Point	.30	B
	Hampton	.90	B
	Harvey Creek	.50	B
	Hayes Ridge 1	3.00	B
	Head Of Fowler	1.50	B
	Hell Roaring/Baldy	.30	B
	Hennessy #2	.50	B
	Honey Flat	5.00	B
	Hudbon	5.00	B
	Hummingbird	2.00	B
	Island Lake Sec. 29	.30	B
	Jehoviak	1.00	B
	Jenning R.R.	.30	B
	Kavalla	1.00	B
	King Mountain	2.00	B
	Kounlaeu	2.00	B
	Lake	.50	B

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Closest Forest	Fire name	Acres	Size Class
14	Lamoka 2	.50	B
	Larch Point	.30	B
	Lighting Peak	1.00	B
	Little Fish	1.00	B
	Little Hoodoo	.30	B
	Lost Girl 1	6.00	B
	Lost Horse Mountain	.30	B
	Lost Stair	.50	B
	Lower Little Wolf	.30	B
	Luckman 2	2.00	B
	M.P. 47	3.00	B
	Mcguire Creek	.30	B
	Mcmillan Jumpers	.50	B
	Meadow Creek North	1.00	B
	Middle Meadow	.50	B
	Mouth Of Beaver Creek	.50	B
	Mystery Water	.30	B
	Napoleon	2.00	B
	North Clay Mountain	.80	B
	O'Neil	.30	B
	Obermeyer #1	.30	B
	Parmenter	2.00	B
	Parsnip	.50	B
	Parsnip #3	1.00	B
	Parsnip #4	.30	B
	Parsnip #5	.50	B
	Partial 6	.50	B
	Pew King	1.00	B
	Pheasant	.50	B
	Pheasant Creek West	.50	B
	Pheasant Peak	.50	B
	Pig	.30	B
	Pillick Trail	.40	B
	Pipe Ridge	3.00	B
	Poker Hill	1.30	B
	Quartz #3	.30	B
	Quartz L.O.	.30	B
	Rabbit Obrien	.30	B
	Rabbitt O'Brien	2.00	B
	Rainbow Lake	5.00	B
	Redemption	2.00	B
	Rice	.30	B
	Riverview	3.00	B
	Robinson	6.00	B
	Roderick 3	1.00	B
	Ross	.50	B
	Russell Mill	.50	B
	S. Fork Jaar	1.00	B

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Closest Forest	Fire name	Acres	Size Class
14	Shafer	.30	B
	Sheldon	.50	B
	Silver Butte	4.00	B
	Sinclair Road	1.00	B
	Skyline #4	1.30	B
	Snowshoe Ridge	2.00	B
	Solo Joe	.50	B
	Solo Joe 2	2.00	B
	Sophie Lake	.50	B
	Souse Gulch	.30	B
	South Hill #1	.50	B
	South Hill #2	.50	B
	South Mcmillan	3.00	B
	Spar Peak	.80	B
	Squaw Creek	2.00	B
	Squaw Creek #3	.30	B
	Squaw Peak 2	7.00	B
	Stanley Min	5.00	B
	Steershead	2.00	B
	Suede 533j	.30	B
	Sullivan	.30	B
	Tepee Creek	1.00	B
	Tow Truck	3.00	B
	Traver	.50	B
	Tubb Gulch	.50	B
	Turtle Lake	1.00	B
	Upham	5.00	B
	Waloven Sec. 10	.30	B
	Water Fields	1.50	B
	Water Gulch	.30	B
	Webb Mountain	.30	B
	Welder Fire	.50	B
	West Bear Creek	.30	B
	West Dry Fork	.40	B
	West Pipe	3.00	B
	Williams Road	.30	B
	Yaak Mill	2.00	B
	Britton	24.00	C
	Brush Creek	40.00	C
	Buck	15.00	C
	Childs	30.00	C
	Conn Mountain	75.00	C
	Devil'S Club 2	75.00	C
	Douglas Hill	30.00	C
	Freeman Ridge	75.00	C
	Gordon Mountain	50.00	C
	Hayes Ridge 2	32.00	C
	Lmoat	10.00	C

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Closest Forest	Fire name	Acres	Size Class
14	Lost Girl 2	50.00	C
	Makay 2	11.00	C
	Mcneely	10.00	C
	Parsnip Face	15.00	C
	Parsnip Mountain	50.00	C
	Rainy Tubb	25.00	C
	Ransome 17	20.00	C
	S. Alaska Peak	80.00	C
	Skinner	20.00	C
	South Hill #3	10.00	C
	Spruce Mountain	69.00	C
	Sugar Loaf	10.00	C
	Upper Fowler	15.00	C
	Water Hill Sec 29	10.00	C
	Webb Knob	55.00	C
	Wold Mountain 2	20.00	C
	Wolf Mountain	15.00	C
	Burnt Sheep	202.00	D
	Devil'S Dad	225.00	D
	Drift Peak	104.00	D
	Goat Rocks	200.00	D
	Hanging Flower	160.00	D
	Lamoka 1	100.00	D
	Parimeter Confine	160.00	D
	Pilick	100.00	D
	South Alaska	171.00	D
	Survey	140.00	D
	Thunderhill	160.00	D
	Will Do	200.00	D
	251359 Gunsight	800.00	E
	336	660.00	E
	45 Pmr Mountain	600.00	E
	76 Burnt Sheep	320.00	E
	Banfield 2	600.00	E
	Cripple Horse 15	600.00	E
	Leigh Creek	874.00	E
	Maxine Pt	440.00	E
	Mc Kay Mountain	840.00	E
	Pillick Ridge	540.00	E
	Pink Mountain	576.00	E
	Roberts Mountain	880.00	E
	Roderick	600.00	E
	Sheep Range 1	600.00	E
	Sheep Range 2	600.00	E
	Twin Meadow	640.00	E
	Willard 3	335.00	E
	Fish Fry	1,420.00	F
	High One	1,403.00	F

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Closest Forest	Fire name	Acres	Size Class
14	North Fork Big Creek	1,500.00	F
	Pulpit Ridge	2,153.00	F
	Smith Peak	1,522.00	F
	Studebaker	1,592.00	F
	Thehideone 268	1,377.00	F
	Turner	2,470.00	F
	Zimmerman Hill	1,046.00	F
	China Meadows	8,801.00	G
	Fowler	11,567.00	G
15	Ahorn	.10	A
	Blind Fork 1	.10	A
	Blind Fork 2	.20	A
	Chicken Complex	2,050.00	F
	Livermore	1,080.00	F
	Tag Creek	1,540.00	F
	Windy Point	4,081.00	F
16	Cut Off	3.00	B
	Fire Creek Ranch	1.50	B
	Freeze Out	1.00	B
	Goat Creek	4.00	B
	Grant Creek	2.00	B
	Grizzly Point	2.00	B
	Little Baldy	1.00	B
	Pirker	1.00	B
	Quigley	1.50	B
	Ross Acres	7.00	B
	State Deerhorn	2.50	B
	Valley Of The Moon	1.00	B
	Van Campen	2.00	B
	Wilson Ranch	8.50	B
	Beacon	20.00	C
	Big S	30.00	C
	Burr Saddle	10.00	C
	Butler	30.00	C
	Chippy 1	60.30	C
	Houle Creek	35.00	C
	Rock Creek 1	22.00	C
	Slaughterhouse	50.00	C
	West Sixmile	44.00	C
	Black Mountain	120.00	D
	Sesame	225.00	D
	Superior Support	243.00	D
	Beaver Slough	780.00	E
	Perma	670.00	E
	Robertson	765.00	E
	Squaw Peak	990.00	E

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Closest Forest	Fire name	Acres	Size Class
16	East Fork Chamberlain	1,214.00	F
	Markle Pass	1,150.00	F
	Starvation	2,450.00	F
	Summer Creek	1,200.00	F
	Henry Peak	8,203.00	G
17	246 Road	.10	A
	62 Creek	.10	A
	Allison Creek	.10	A
	Archer	.10	A
	Backbone	.10	A
	Bald Mountain	.25	A
	Bargamin	.10	A
	Barren	.10	A
	Battle Creek	.10	A
	Big Bowl	.10	A
	Big Creek Lakes	.10	A
	Big Park	.10	A
	Big Rock	.10	A
	Bilk	.20	A
	Billy	.20	A
	Blair Flats	.10	A
	Boston Mountain	.10	A
	Box Car Creek	.10	A
	Brown Springs	.10	A
	Brush	.10	A
	Buckknob	.10	A
	Bull	.10	A
	Bull Creek	.10	A
	Bull Ridge	.10	A
	Bullion	.10	A
	Burn Creek	.10	A
	Burnt Tree	.10	A
	Cache Creek	.10	A
	Canyon	.10	A
	Cape Horn	.10	A
	China Point	.10	A
	Churchill	.10	A
	Clear Creek	.10	A
	Clear Creek	.10	A
	Cold Springs	.10	A
	Concord	.10	A
	Concord Hill	.10	A
	Cool Spot	.10	A
	Coolwater	.10	A
	Coolwater	.25	A
	Cove	.10	A
	Cow Many	.10	A

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Closest Forest	Fire name	Acres	Size Class
17	Crooked	.10	A
	Crow Creek	.10	A
	Dairy Mountain	.10	A
	Dead Point	.10	A
	Deep Creek	.10	A
	Dennis Ridge	.25	A
	Dentist Parlor	.10	A
	Diamond Rock	.10	A
	Doe Creek	.20	A
	Dog	.10	A
	Donkey Creek	.10	A
	Double Down	.10	A
	Drake Fire	.20	A
	Drumlummen	.10	A
	Dry Saddle	.10	A
	East Bilk	.10	A
	East Dixie	.13	A
	East Fork Mallard	.25	A
	East Lodge	.10	A
	El Wa	.20	A
	Elk	.10	A
	Elk Horn	.10	A
	Elk Ridge	.10	A
	Elk Track	.10	A
	Fall Creek	.20	A
	Falls Smoke	.10	A
	First	.10	A
	Florence	.10	A
	Freeman	.10	A
	Friendly Neighbor	.10	A
	Gardiner	.10	A
	Gardiner Fork	.10	A
	Goat	.10	A
	Goat Ridge Spring	.10	A
	Gold Pan Creek	.10	A
	Grass	.10	A
	Green Mountain	.10	A
	Grouse Ridge	.10	A
	Hanover	.10	A
	Hay	.10	A
	Hill	.10	A
	Hobo	.10	A
	Honey	.10	A
	Hot Springs	.10	A
	Hundred Dollar	.10	A
	Iron Mountain	.10	A
	Isaac	.10	A
	J.T.	.10	A

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Closest Forest	Fire name	Acres	Size Class
17	Jack Mountain	.20	A
	Jersey Mountain	.10	A
	Joe	.10	A
	John Day	.10	A
	Junction	.10	A
	Kessler Creek	.10	A
	Key Creek	.10	A
	Kim Creek	.10	A
	Lake Creek	.10	A
	Langdon Point	.10	A
	Last Chance Gulch	.10	A
	Life'S A	.10	A
	Lightfoot	.10	A
	Lightning Creek	.10	A
	Line Creek	.25	A
	Little	.10	A
	Little Duck	.10	A
	Little Van Buren	.10	A
	Lookout	.10	A
	Lost	.10	A
	Lost Horse Pass	.10	A
	Lower Goat	.10	A
	Lynx Ridge	.10	A
	M.P. 34.5	.10	A
	Mallard	.10	A
	Mammoth	.10	A
	Mammoth Mountain	.10	A
	Mare	.25	A
	Martin Hill	.10	A
	Martin Hill #2	.10	A
	Meadow	.10	A
	Miller Creek	.10	A
	Moose Butte	.10	A
	Moose Calf	.10	A
	Mr. Bills	.10	A
	Mullins	.10	A
	Mystery	.10	A
	Noble	.10	A
	North	.10	A
	North Bluff	.10	A
	North Mud	.10	A
	Nowhere Ridge	.20	A
	O'Hamby	.10	A
	O'Hara Point	.10	A
	Olive Creek	.10	A
	Otter Creek	.10	A
	Paracox	.10	A
	Parker Mountain	.13	A

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Closest Forest	Fire name	Acres	Size Class
17	Pasture Ridge	.10	A
	Patrol Point	.10	A
	Pilot Rock	.20	A
	Plummer Point	.10	A
	Pole	.10	A
	Pole Fire #2	.10	A
	Rabbit	.10	A
	Race Creek	.10	A
	Rasberry	.10	A
	Rock Pillar	.10	A
	Ruthy	.10	A
	Saddle Mud	.10	A
	Salt Creek	.10	A
	Santa	.10	A
	Santa Creek	.10	A
	Second	.25	A
	Seventeen	.25	A
	Shearer Peak	.10	A
	Shingle Creek	.10	A
	Shizzler	.25	A
	Silver Dome	.10	A
	Sinker Mountain	.10	A
	Slide	.10	A
	Soda Creek	.10	A
	Sourdough Peak	.20	A
	South Bitch	.10	A
	South Fork Noble	.10	A
	South Goat	.10	A
	Squaw	.10	A
	Squirrel Creek #1	.10	A
	Squirrel Creek #2	.10	A
	Stacked	.10	A
	Stag	.10	A
	Station	.10	A
	Stillman Lake	.10	A
	Straw	.25	A
	Suebee	.10	A
	Summit Flats	.20	A
	Surprise	.10	A
	Switch Back	.10	A
	Thorn Gulch	.10	A
	Three Rocks	.10	A
	Tinker Tahoe #1	.10	A
	Tinker Tahoe #3	.10	A
	Top Dog	.20	A
	Trapper Creek	.10	A
	Trout Springs	.10	A
	Twenty Mile	.10	A

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Closest Forest	Fire name	Acres	Size Class
17	Twenty Mile Bar	.10	A
	Twenty Mile Butte	.10	A
	Twin Cabin	.10	A
	Two Dog	.10	A
	Umbrilla Butte	.10	A
	Upper Selway	.25	A
	Wall Point	.10	A
	Warning	.10	A
	Wash Basin	.10	A
	West Bowl	.10	A
	West Running	.10	A
	West World	.20	A
	Widder Ridge	.20	A
	Wilkerson	.10	A
	Williams Creek	.10	A
	Y.C.C.	.10	A
	Yakima	.10	A
	19 Mile	.50	B
	Barren Hill	.30	B
	Bat Rock	.90	B
	Big Creek	.30	B
	Big Fog	.30	B
	Big Slide	4.00	B
	Bitch View	.40	B
	Condo Row	.50	B
	Corral Hill	.80	B
	Dog Leg	.80	B
	East Moose	.50	B
	Grave Meadow Peak	.30	B
	H Squared	.30	B
	Horse Jaw	.50	B
	Ironed Out	1.00	B
	Johnson Creek	.30	B
	Last	.80	B
	Lil Round Top	.30	B
	Little Boulder Creek	.30	B
	Lizard	.30	B
	Lower Rackliff	.30	B
	Mink Peak	.30	B
	North Blacktail	.50	B
	North Noble	.30	B
	North Peak	2.00	B
	Not Again	.50	B
	Pack Creek	.30	B
	Packer Creek	.50	B
	Prong Creek	.50	B
	Pyramid Peak	.30	B
	Rocky Bluff	.50	B

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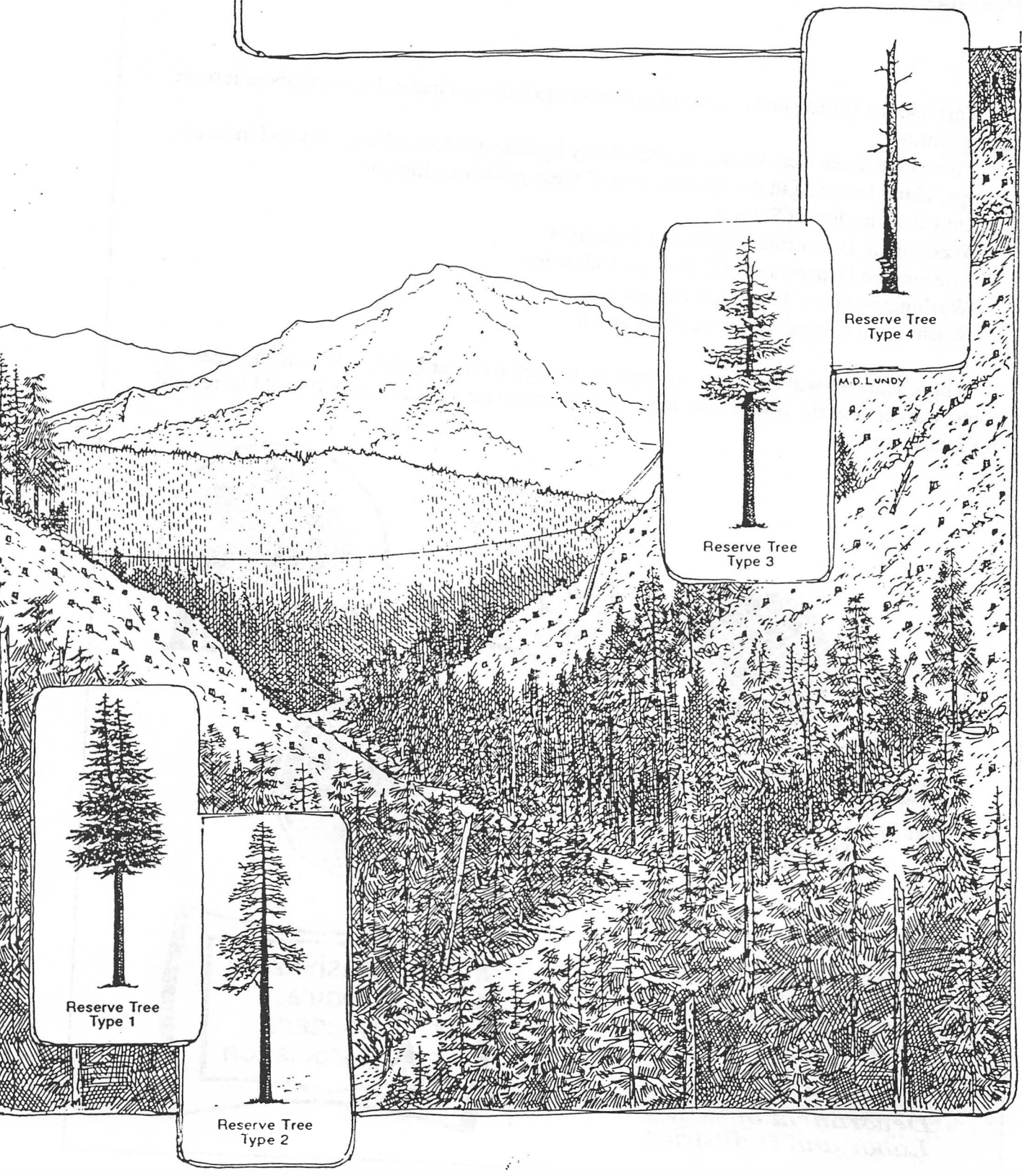
Closest Forest	Fire name	Acres	Size Class
17	Silver Bridge	.50	B
	Slate Creek	.50	B
	Sob Creek	.80	B
	Southfork	.50	B
	Spook	.33	B
	Springs	.33	B
	Tamarack Ridge	.50	B
	Three Prong	1.25	B
	Tinker Tahoe #2	.50	B
	Upper 19 Mile East	2.50	B
	Upper 19 Mile West	2.00	B
	Upper Rackliff	.50	B
	Upper Wash	.30	B
	Upper West Fork	.27	B
	Waboohoo	.30	B
	Warm Springs	.33	B
	Weasel	.50	B
	Wesst Moose	.50	B
	West Goddard	.30	B
	Whole	.30	B
	Wylies Ridge	.50	B
	Gateway	55.00	C
	Tribulation	22.00	C
	C K Creek	12,200.00	G
?	Dummy		A
	Howling	300.00	E
	Tern	472.00	E

Total acres by size class
October 28, 1994

Size Class	# Fires	Acres
A	1269	217.51
B	479	1,265.54
C	108	4,391.30
D	39	6,708.00
E	42	25,561.00
F	36	66,249.00
G	9	89,828.00
*****	1982	194,220.35

Guidelines for Selecting Reserve Trees



Reserve tree selection guidelines

Preface

1992

This booklet is designed as a set of guidelines to help you make decisions about reserve tree retention.

These guidelines were written cooperatively by state and federal agencies and industry groups. Those involved in the development of these guidelines include:

United States Forest Service
Washington Department of Natural Resources
Washington Department of Labor and Industries
Washington Forest Protection Association
Washington Contract Loggers Association.

This document will be reviewed annually to keep it contemporary. As you and other forest workers use the booklet, we hope you will consider ways in which it could be refined for future use.

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

WFPA

WASHINGTON STATE DEPARTMENT OF
Natural Resources

Brian Boyle - Commissioner of Public Lands
Art Stearns - Supervisor

WASHINGTON DEPARTMENT OF WILDLIFE

State of Washington
Department of
Labor and Industries

Washington Contract Loggers Association

Reserve tree selection guidelines

1992

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Reserve tree selection guidelines

Introduction 1992

Dead, dying and live defective trees are an important part of a healthy forest.

They provide habitat for birds, mammals, amphibians, reptiles, insects and a variety of plants.

These trees, as well as non-defective trees, now are being managed in forests as reserve trees.

Although reserving trees for wildlife can be challenging, with some forethought, they can be safely retained.

All potential reserve trees in the work area need to be evaluated to determine if a hazard exists.

These guidelines are intended for use in any forest practice activity where reserve trees are to be retained.

They are not policy. They provide a technical framework for achieving the objective of retaining reserve trees in concert with safe work practices and forest and wildlife management goals.

This should provide a basis for common understanding and cooperative efforts among loggers, foresters, biologists and safety specialists.

Elements of successful reserve tree planning are discussed.

Definitions and strategies for selecting reserve trees are presented that are compatible with modern forest practices and safety.

This should provide more options and flexibility for forest workers and lay the foundation for informed decisions about safe work practices and resource objectives.

Reserve tree selection guidelines

Safety planning is essential to ensure that workers are not exposed to the hazards of danger trees, and that the objectives for retaining reserve trees are achieved.

It must be an integral part of reserve tree retention plans.

The objective of the safety plan is to provide a safe working environment for the forest worker.

This is what you need to do to have an effective safety plan:

- Know the reserve tree objectives.
- Develop a viable site plan.
- Communicate it to all workers.
- Follow the plan.
- Monitor it continuously.
- Modify it if necessary.

Know the reserve tree objectives

Reserve tree objectives will determine the kinds, sizes, characteristics and locations of trees.

Knowing what the needs are, and why, will help in knowing what is useful and not useful when considering which cutting and logging techniques to use.

This helps to identify the options to work with when designing a safety plan.

Wildlife needs

A tree, when reserved for cavity-using wildlife, is either dead, dying or live defective.

It is extremely important, for both biological and safety reasons, to remember that this includes all trees from the live defective condition to fully dead.

Operating with this definition will expand the options for a workable plan.

Reserve tree selection guidelines

Planning

1992

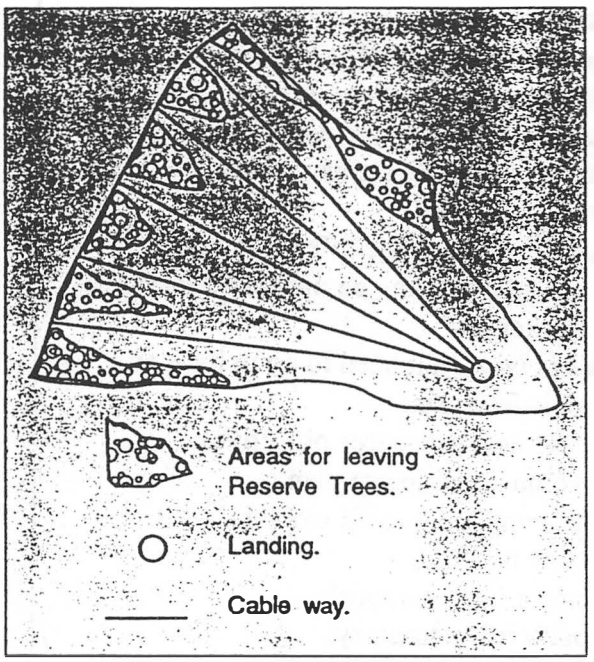


Fig. 1. — Distribution of clumps in a unit.

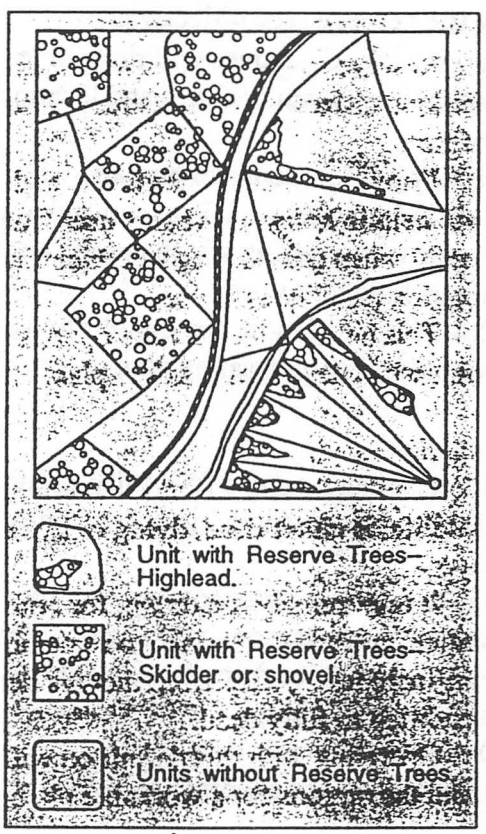


Fig. 2. — Distribution of units in a planning area.

Wildlife species that use cavities in trees are dependent on three major variables for survival:

- number and distribution of reserve trees
- height and diameter of reserve trees, and
- amount of decay in reserve trees.

A reserve tree objective for cavity-users would include these variables.

Long-range planning

Long-range planning on a large scale gives you more design options for safe ways to reserve trees for meeting wildlife needs.

The arrangement and distribution of reserve trees is key to meeting wildlife objectives in a manner compatible with safe work practices.

Uniform distribution of reserve trees on every acre is not necessary. Reserve trees can be clumped to accommodate operational needs. If adequate amounts of trees, clumps and units are well dispersed throughout the planning area, you may meet cavity-using wildlife needs (Figs. 1 and 2).

Long-range planning needs to allow for changes in reserve trees. For example, different tree species have different decay rates. Their classification will change through time.

There often is a time lag between unit layout and harvest. Long-range plans should provide criteria for tree selection and distribution that are flexible enough to account for ongoing tree decay processes and changes in the harvest plan.

Before forest practices begin, review the plan and adjust it to accommodate any changes in reserve tree classifications.

It also is important to consider how reserve trees will fit into plans for forest practices after harvest.

Reserve tree selection guidelines

This is especially important in uneven age management schemes where multiple entries are planned. When developing conceptual long-range plans and site-specific plans, consider whether a hazard would exist by the time future forest practice activities would take place.

Develop a viable site plan

A viable plan is one that prevents worker exposure to danger trees.

Many of the difficulties in retaining reserve trees during logging can be eliminated through careful site evaluation, considering the specific abilities of equipment and processes, planning and communication (Table 1).

Those involved in planning may include: landowner, purchaser, felling contractor, logging contractor, and safety, biology and forestry specialists.

Once specific reserve tree objectives are identified, assess the availability of reserve tree types, amounts and distribution in the unit.

Some will be danger trees if a hazard is present and there is potential for worker exposure. Identify and eliminate the hazards they present before exposing workers in all stages of the harvest operation.

Consider the logging system, topography, unit layout and any other pertinent factors and outline strategies to keep workers out of hazard areas of danger trees.

Each individual tree in the unit need not be assessed; rather, categorize the types of trees and general layout of the logging operation, and devise safety strategies for the variety of situations that may be encountered.

Table 1

Site planning checklist

- ☐ Identify the reserve tree objectives.
- ☐ Evaluate work site conditions.
- ☐ Consider the specific abilities of equipment and processes to be used.
- ☐ Devise harvest practices which safely retain the amount, distribution, sizes and kinds of reserve trees desired.
- ☐ Map out the general plan.

An alternative to marking clumps or individual trees on the ground is to map their general locations.

For example, clumps between cable roads that contain desired types of reserve trees may be mapped once landings and tail holds are identified.

Communicate to all workers

It is the responsibility of all woods workers to be informed of the hazards of working around danger trees.

They should be able to recognize a danger when it exists, and know how to deal with the situation. Specifically, all woods workers should:

- Review the safety plan with their supervisors before entering a new area, setting or new activity.
- Be able to recognize the four reserve tree types.
- Be able to avoid the hazard areas around Type 3 and Type 4 reserve trees.

Because timber fallers are usually the first workers to approach a danger tree or snag during the harvest activity, they are at greatest risk of having an accident.

Also, the trees they cut or retain determine the remaining opportunities for reserve tree retention in the harvest unit.

Including timber fallers in planning, or at least communicating the plan to them, is critical to achieving both safety and reserve tree objectives.

Follow the plan

It is the responsibility of all workers to conduct their work according to the safety strategies in the plan.

Monitor continuously

Once the operation has begun, conditions may change.

It is the responsibility of both supervisor and workers to be alert to new or unanticipated hazards that may arise.

If a strategy is ineffective or becomes unworkable, it must be re-evaluated.

Modify if necessary

If new or revised strategies are needed, they should be developed before work proceeds further. Changes in the safety plan must be communicated to all workers on the site.

The following sections, Reserve Tree Types and Hazard Areas and Operational Guidelines, contain information which should be used in the development of the safety plan.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992

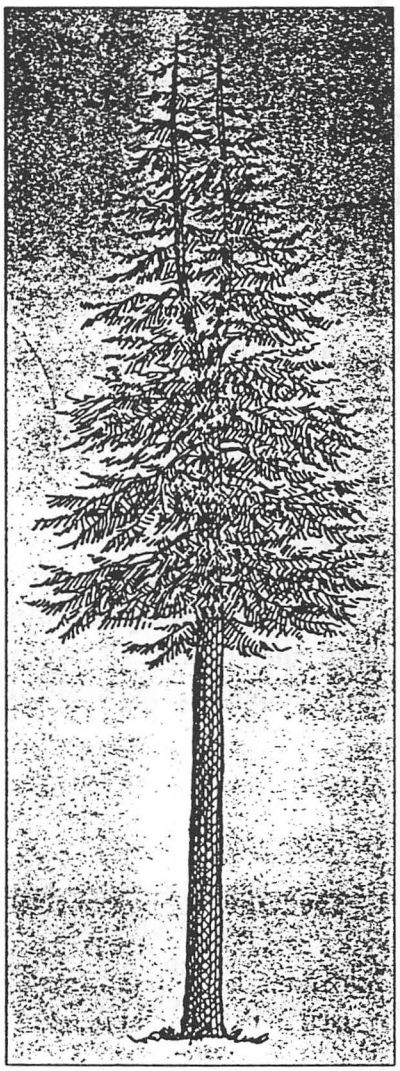


Fig. 3. — Reserve tree Type 1.

Reserve tree types — conifer only

Recognizing reserve tree types is the first step in identifying potential hazard areas. These definitions are based upon conditions that affect the tree's stability that are visible to an observer on the ground.

They are divided into four classifications, ranging from the safest to the most dangerous.

For example, Type 1 reserve trees have low-hazard and low-failure probability, while Type 4 reserve trees have extreme-hazard and extreme-failure probability. Non-defective, healthy green trees are not classified. All reserve trees fit one of these types.

Specific defects which could cause failure must be evaluated for each reserve tree.

When a reserve tree type is questionable, it should be assigned the next higher type.

Type 1 reserve trees are live trees that are defective or deformed with sound tops, trunks, and roots (Fig 3).

They may have part of the top broken out or have evidence of other defects that include "cat face," animal chewing, old logging wound, weather injury, insect attack, or lightning strike.

Because these trees are stable, they pose the least hazard to workers.

Type 1 trees may be retained wherever healthy trees could be retained safely.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992

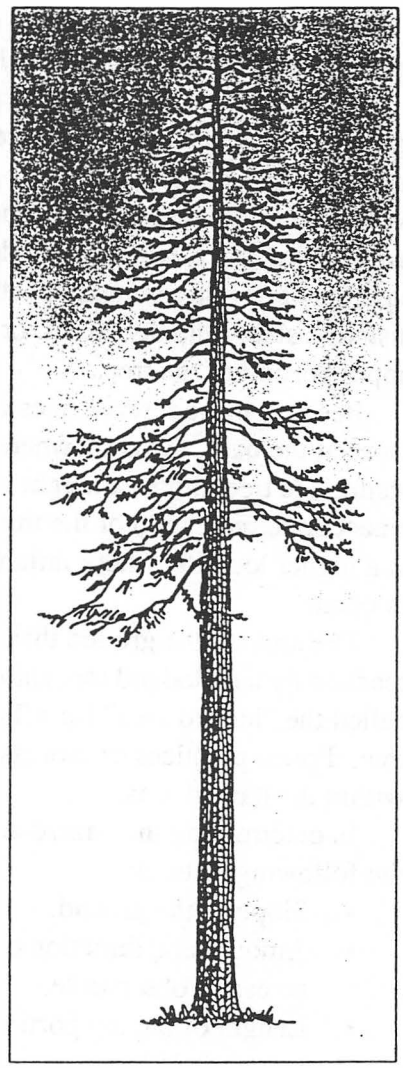


Fig. 4. — Reserve tree Type 2.

A **Type 2** reserve tree is a dead tree with sound top, trunk, and roots (Fig. 4).

Identifying Type 2 reserve trees requires careful observation. Mortality may have been caused by canker, diseases, insects, fire, adverse weather or lightning. Needle and small twig retention is evidence of recent death, which may be an indicator of stability.

Fire-scorched trees may remain stable for many years if the trunk and root systems are not badly burned.

However, not all fire-scarred trees may be safe. Pre-existing defects may be charred and difficult to detect, rendering a tree that was dangerous before the fire even more dangerous afterward.

If the fire burned the root system, it may be damaged, changing it from a Type 2 to a Type 4 reserve tree. Similarly, trees infected with root rots have weakened root systems that automatically classify them as Type 4 reserve trees.

Because Type 2 reserve trees have stable tops, trunks, and roots, they may be retained wherever healthy, green trees could be retained safely.

Reserve tree selection guidelines

Reserve tree types and hazard areas 1992

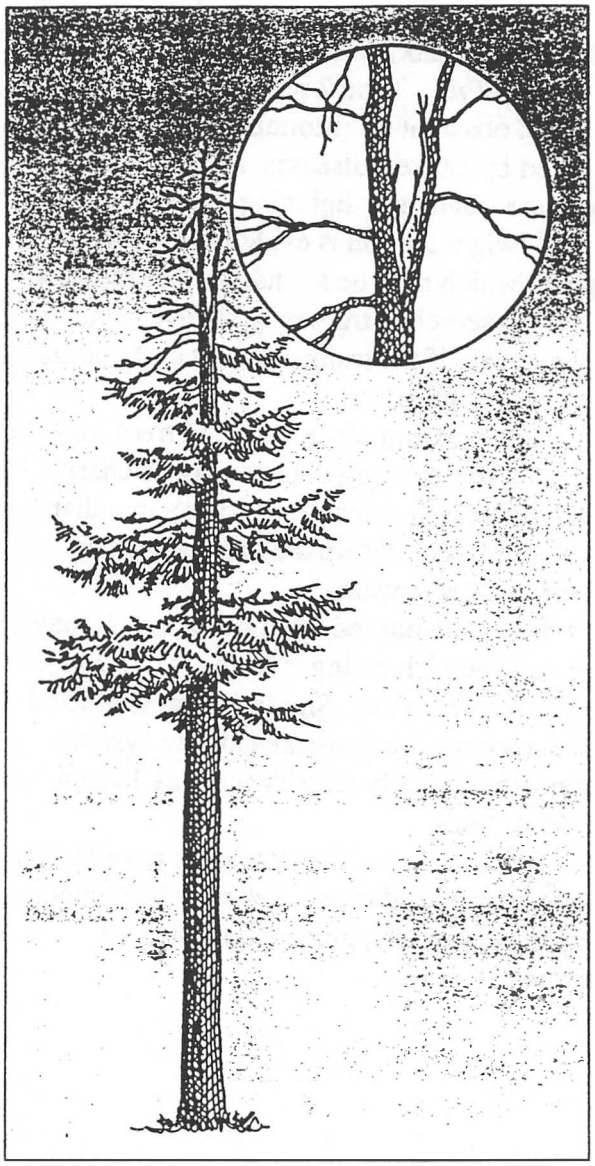


Fig. 5. — Reserve tree Type 3.

Type 3 trees are live or dead trees with unstable tops or upper portions (Fig. 5).

Although the roots and main portions of the trunk are sound, these reserve trees pose high hazard because of defect in live or dead wood higher up in the tree. Ground vibration from falling trees, wind, flying debris, heavy equipment or other industrial activity can dislodge slabs, chunks, limbs, or the entire upper portion of the tree.

Because these reserve trees do not collapse at the base, but somewhere above, testing the tree at breast height will not give an accurate indication of the tree's condition at a higher location where failures are likely to occur.

The area on the ground that could be reached by a dislodged top, slab or chunk is called the "hazard area" for a Type 3 reserve tree. Forest practices cannot take place within the hazard area.

In determining the hazard area, evaluate the following criteria:

- Slope of the ground.
- Amount and direction of lean — must be easily observable.
- Length of the top portion that would dislodge.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992

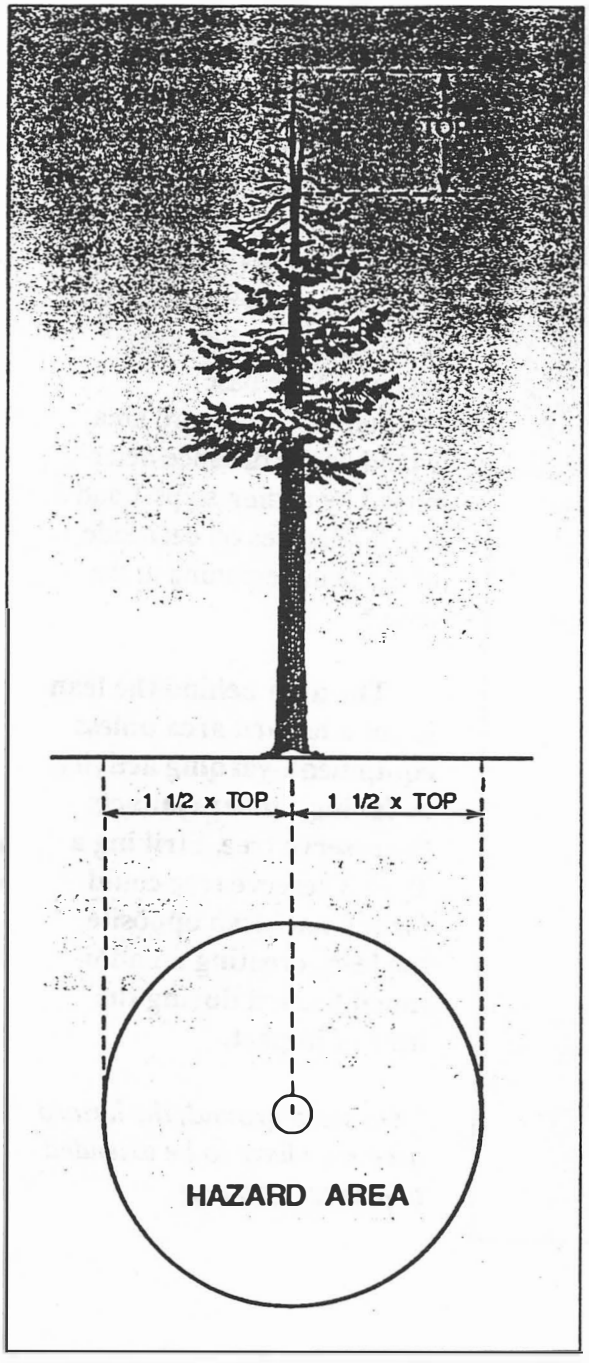


Fig. 6. — Hazard area for a Type 3 reserve tree with no discernable lean.

Level or sloped ground ... no discernable lean (Fig. 6)

Step 1. Determine the length of the top or portion that would dislodge and add one half of its length.

Step 2. The hazard area forms a circle around the tree with a radius equal to 1 1/2 times the length of the dislodged portion.*

** On steep ground, the hazard area may have to be extended to protect workers.*

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992

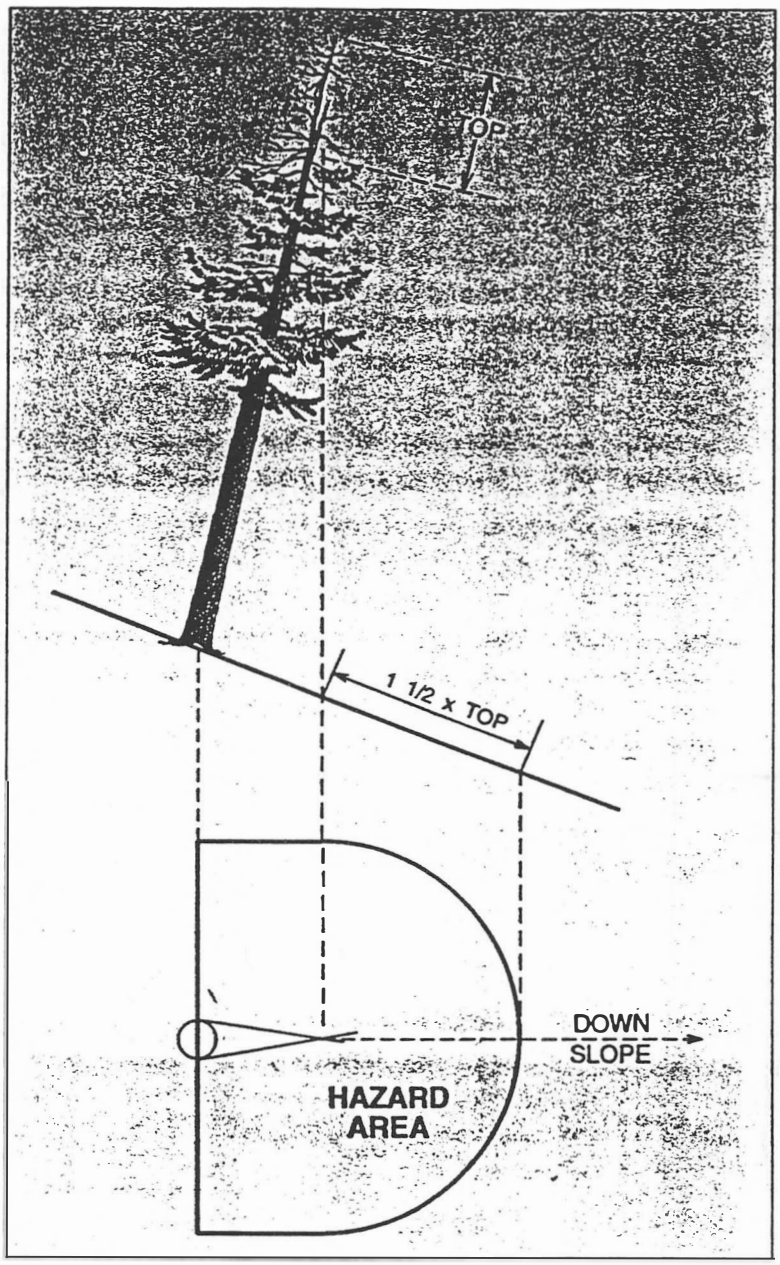


Fig. 7. — Hazard area for a Type 3 tree with lean.

Level or sloped ground ... lean in any direction (Fig. 7)

Step 1. Determine the length of the top or portion that would dislodge and add one half of its length.

Step 2. Determine the amount of lean (horizontal distance from where the top or portion would dislodge relative to the base).

Step 3. The hazard area would be the distance determined by adding steps 1 and 2 and 90 degrees on each side of the lean beginning at the base.*

The area behind the lean is not a hazard area unless equipment, yarding activity or falling timber contacts the reserve tree. Striking a Type 3 reserve tree could force a backlash opposite the lean, creating an additional hazard during the time of impact.

** On steep ground, the hazard area may have to be extended to protect workers.*

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992

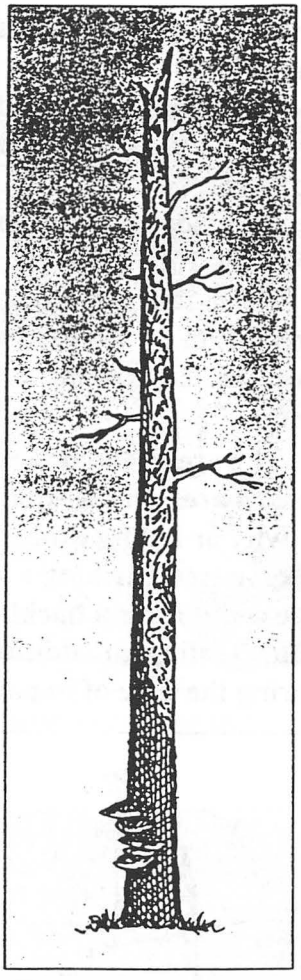


Fig. 8. — Reserve tree Type 4.

Type 4 reserve trees are live or dead with unstable trunk or roots, with or without bark. This includes "soft" snags as well as live trees with unstable roots caused by root rot or fire. They are considered the most dangerous type.

Unexpected collapse could occur from any portion of the roots or trunk. Testing the snag at breast height will not give an accurate indication of the tree's condition higher up where failures can occur.

The hazard area for a Type 4 reserve tree is defined as the area on the ground that could be reached by any portion of the tree that may collapse.

Forest practices cannot take place within the hazard area.

In determining the hazard area, the following criteria must be evaluated:

- Slope of the ground.
- Direction of lean.
- Height of the tree.

Reserve tree selection guidelines

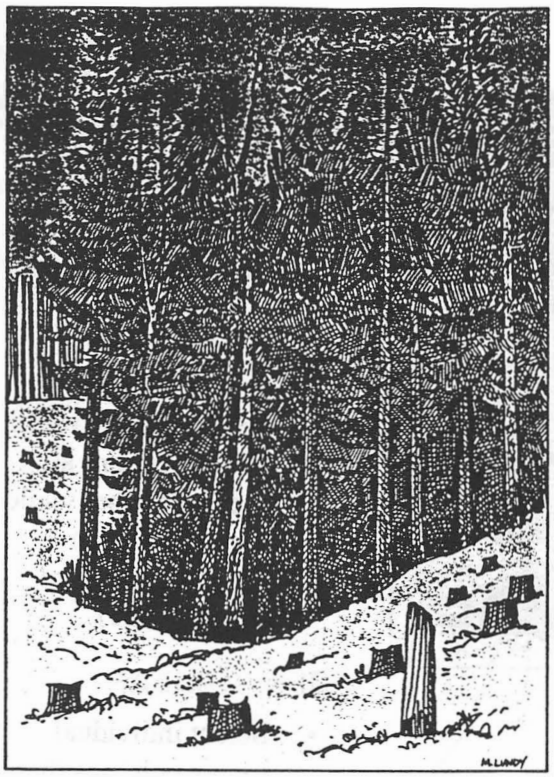


Fig. 13. — A Type 4 reserve tree isolated in a clump of safe trees.

- Leaving safe trees within the hazard area of a Type 3 or 4 reserve tree (clumping) is an effective way to isolate workers from exposure to the hazard (Fig. 13).

- If trees fall into the hazard area of a Type 3 or 4 reserve tree, leave them unbucked so they can be choked or grappled without having workers or the cab of machinery entering the hazard area (Fig. 14).

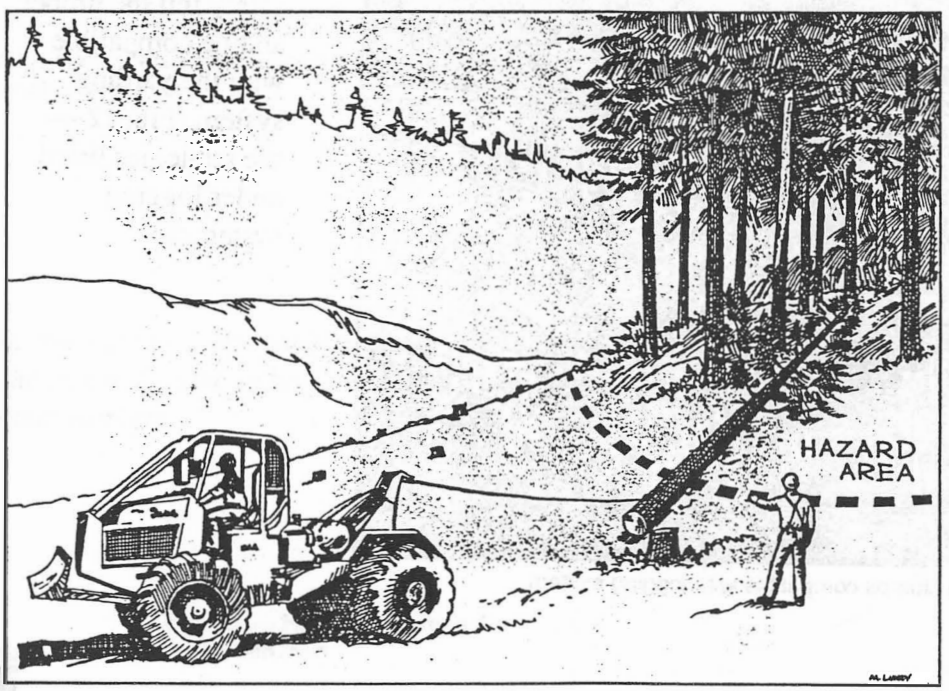
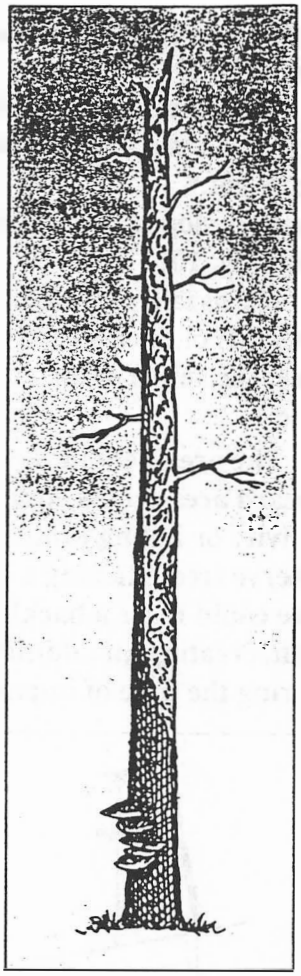


Fig. 14. — Reaching trees from outside the hazard area.

Reserve tree selection guidelines

Reserve tree types and hazard areas

1992



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Unexpected collapse could occur from any portion of the roots or trunk. Testing the snag at breast height will not give an accurate indication of the tree's condition higher up where failures can occur.

The hazard area for a Type 4 reserve tree is defined as the area on the ground that could be reached by any portion of the tree that may collapse.

Forest practices cannot take place within the hazard area.

In determining the hazard area, the following criteria must be evaluated:

- Slope of the ground.
- Direction of lean.
- Height of the tree.

Reserve tree selection guidelines

Reserve tree types and hazard areas 1992

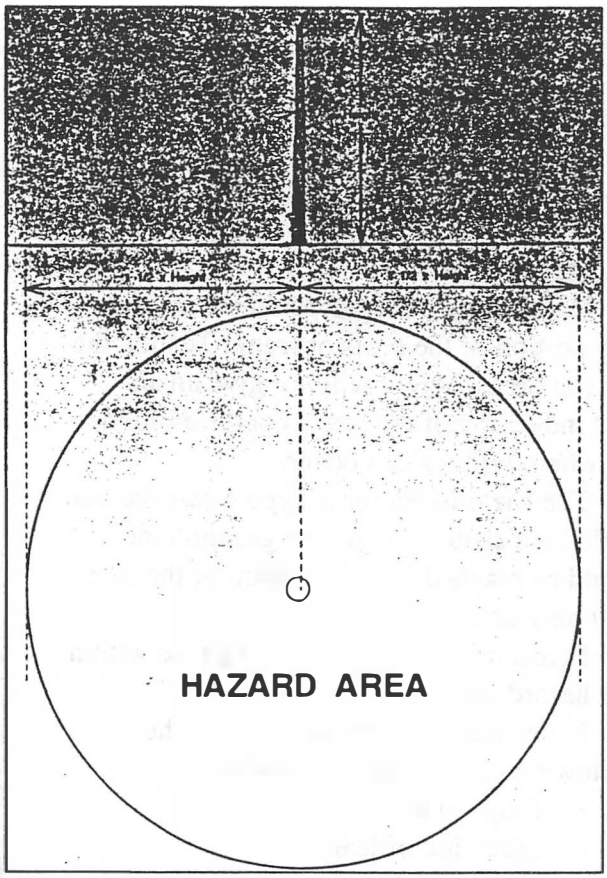


Fig. 9. — Hazard area for a reserve tree Type 4 with no discernable lean.

**On steep ground, the hazard area downhill of the tree may have to be extended to protect workers.*

Level or sloped ground, no discernable lean (Fig. 9)

The hazard area would form a circle around the tree with a radius of 1 1/2 times the height.*

Level or sloped ground, lean in any direction (Fig. 10)

The hazard area would be 90 degrees on each side of the lean and within 1 1/2 times the height of the tree beginning at the base.*

The area behind the lean is not a hazard area unless equipment, yarding activity or falling timber contacts the reserve tree. Striking a Type 4 reserve tree could force a backlash opposite the lean, creating an additional hazard during the time of impact.

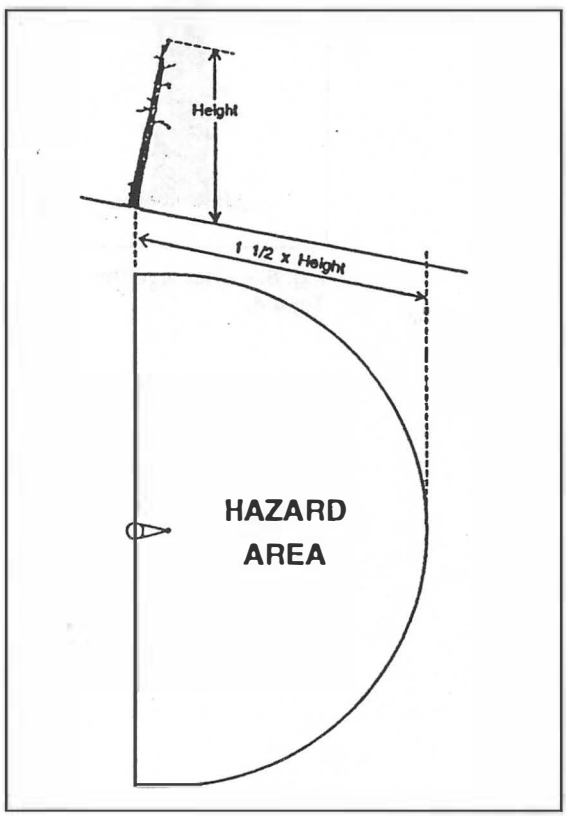


Fig. 10. — Hazard area for a Type 4 tree with lean.

Reserve tree selection guidelines

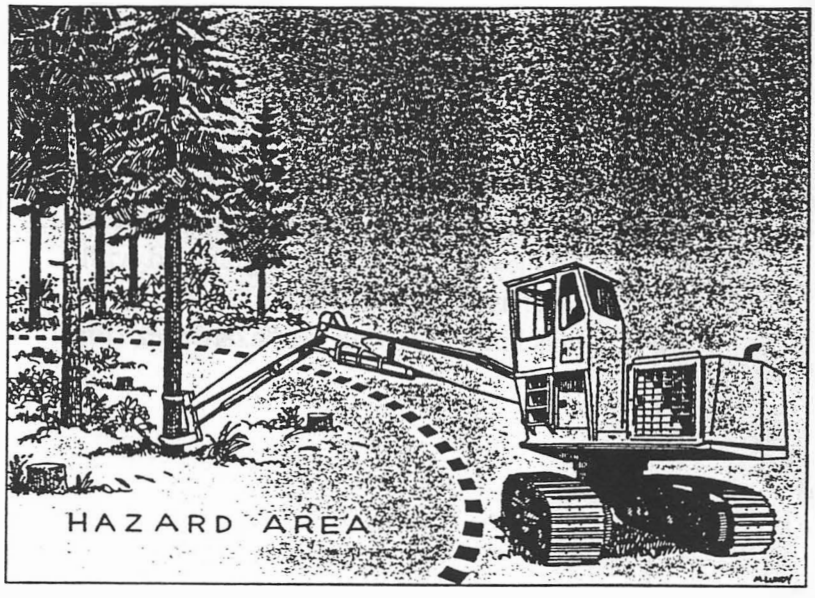


Fig. 11. — Felling trees from outside the hazard area.

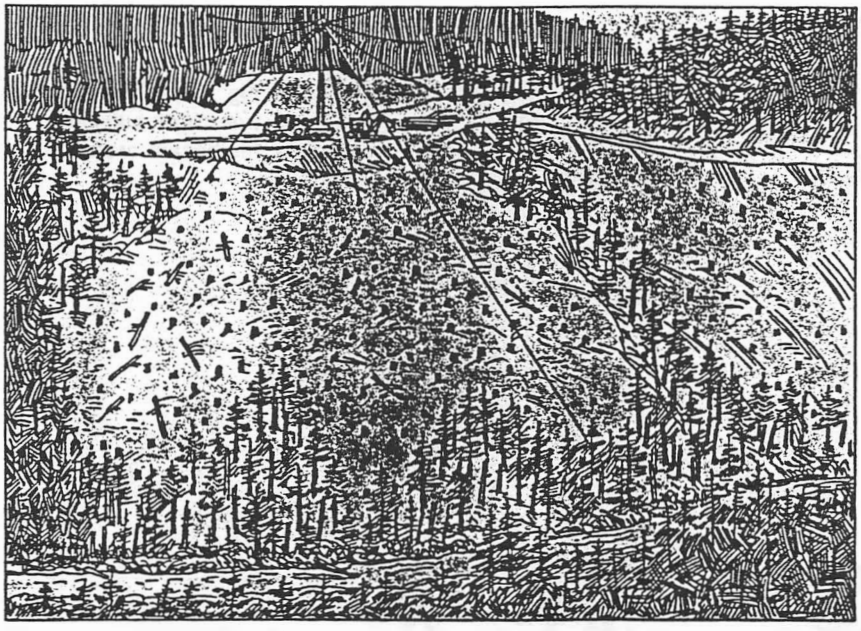


Fig. 12. — Reserve tree clumps compatible with logging system.

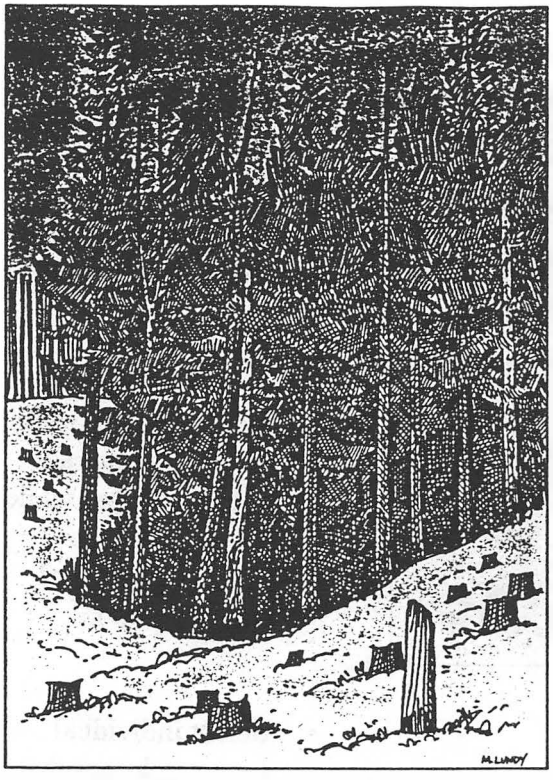
Timber felling: manual and mechanized

Some strategies for retaining reserve trees:

- Mechanized felling equipment allows the operator to reach into the hazard area and fell timber while keeping the cab outside the hazard area (Fig. 11).

- Select individual trees or clumps that will allow fallers to safely fell the timber and be compatible with the yarding system (Fig. 12 — see strategies listed under logging systems).

Reserve tree selection guidelines



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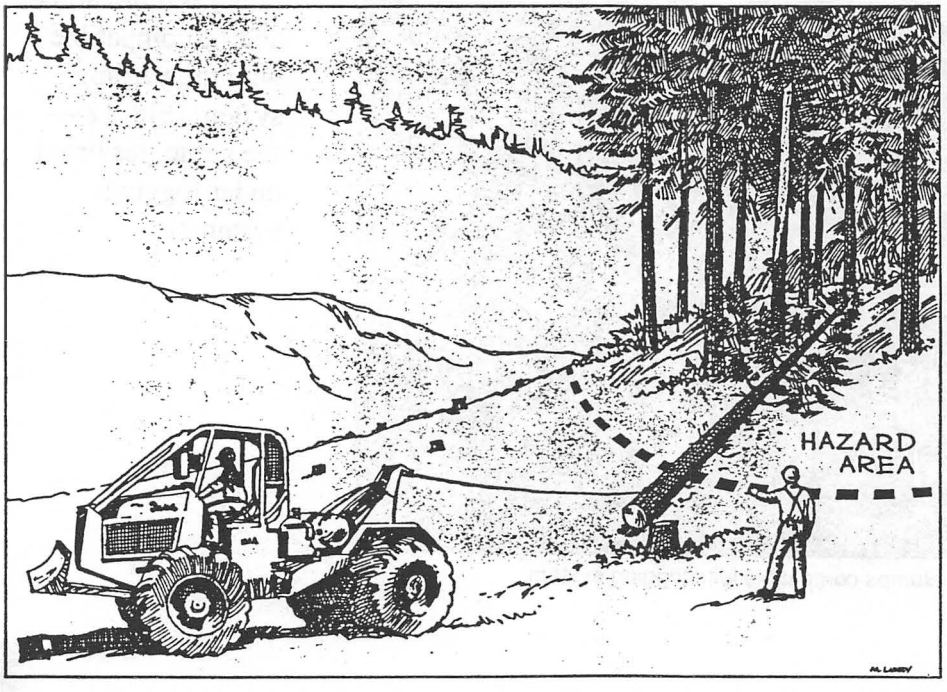

Fig. 14. — Reaching trees from outside the hazard area.

Reserve tree selection guidelines

Operational guidelines 1992

Ground-based logging systems: Tractor logging Loader/shovel logging

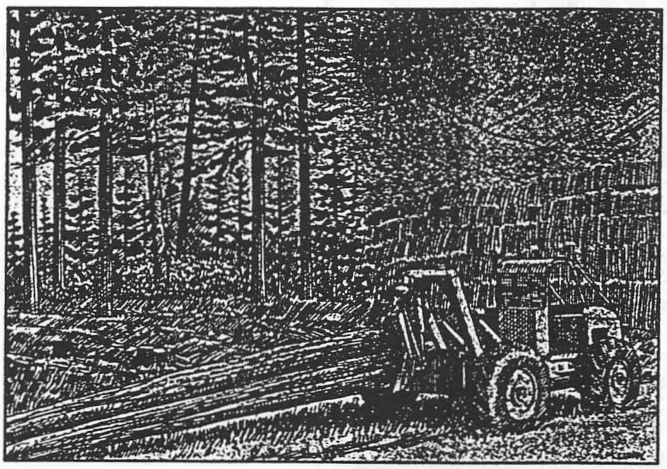

Fig. 15. — "Leaners" away from work area.

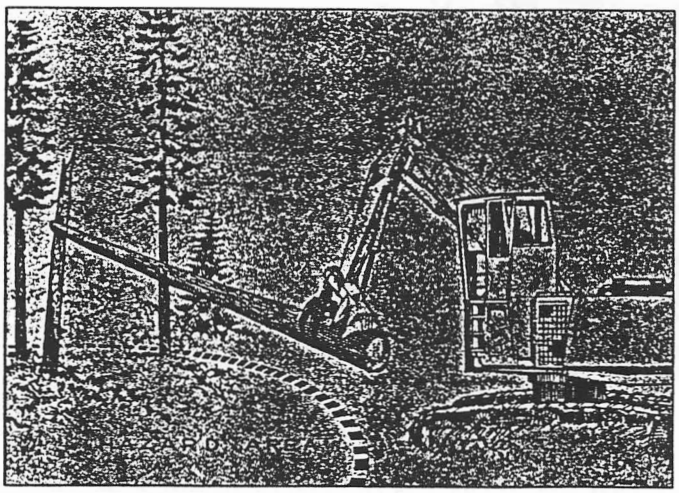

Fig. 16. — Reducing snag to a safe height.

Ground-based equipment has the ability to maneuver around obstacles such as stumps, trees and snags. Groups of trees, or single trees, can be located nearly anywhere on the unit since ground-based equipment can approach them from various directions. However, the location of reserve trees must not pose a danger to workers.

Trees classed as Type 1 or 2 may be retained individually or in clumps wherever healthy green trees could be retained within the unit. If Type 3 or 4 reserve trees are selected for retention, work (including landings and skid trails) cannot take place within their hazard area.

Strategies for locating Type 3 or 4 trees:

- Hazard areas along the edge of the unit are easiest to avoid. Potential danger trees should lean away from the work area (Fig. 15).

- While loader/shovel logging, you may encounter a potentially dangerous reserve tree that can be reduced to a safe height by using a grappled log to push the unstable portion down. The cab must be outside the hazard area. Once a snag is reduced to a safe height, trees that were located in the hazard area could be harvested (Fig. 16).

Reserve tree selection guidelines

Fig. 17. — Distribution of reserve trees.

- Single trees and clumps may be dispersed inside the unit as long as work doesn't take place within any hazard area. Locate landings and skid trails outside hazard areas. Leaving safe trees within the hazard area (clumping) is an effective way to isolate work from the hazard (Fig. 17).

Reserve tree selection guidelines

Cable yarding

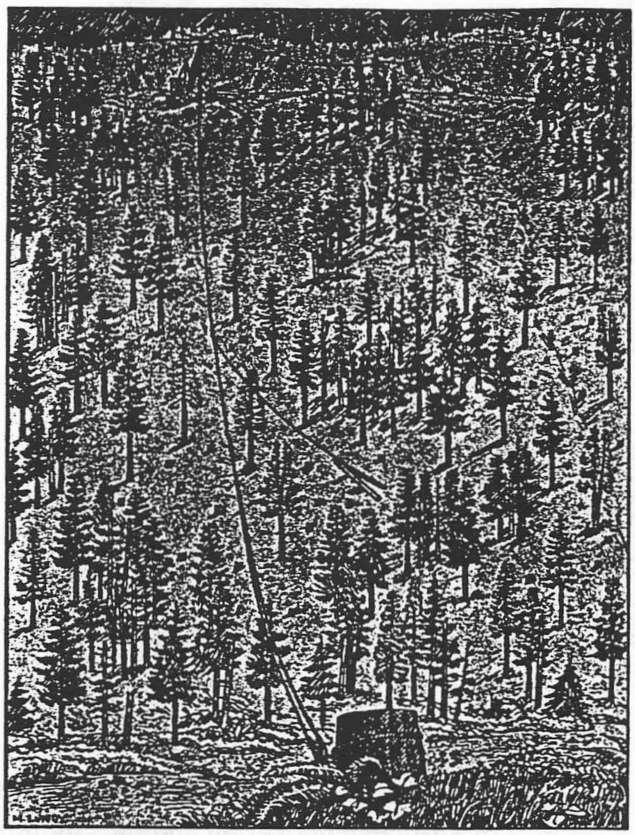

Fig. 18. — Individual reserve trees and clumps distributed in a lateral skidding unit.

The type of yarding system and topography will determine where reserve trees may be safely retained. For example, there are more opportunities for retaining reserve trees in midsetting using a system with lateral skidding capability than with highlead.

Trees classed as type 1 or 2 may be retained individually or in clumps wherever healthy green trees can be retained within the unit. If Type 3 or 4 reserve trees are selected, landings, yarder lines and workers cannot be within the hazard area.

Strategies for retaining reserve trees:

- Individual Type 1 or 2 reserve trees can be located within the unit. Their distribution must be compatible with the type of yarding system (Fig. 18). Lateral skidding systems are the most flexible because of their ability to reach a great distance from the skid road and yard logs around obstacles. Highlead is the least flexible.

- Leaving safe trees within the hazard area of a Type 3 or 4 reserve tree (clumping) is an effective way to isolate workers from exposure to the hazard (Fig. 13).

- Locate clumps or individual trees between skid roads on fan type or parallel settings. The size and shape of a clump is determined by the distance between skid roads, yarding system and hazard area (Fig. 12).

Fig. 19. — Clumps in mid-setting.

- Clumps may be left in midsetting if there is sufficient deflection and the equipment has the ability to suspend logs over the clump or yard from around the clump (Fig. 19). Note, yarding lines must not be located within the hazard area of a Type 3 or 4 reserve tree.

- Other locations include:
  — Along the edge of the unit (Fig. 12).
  — On yarding breaks between settings (Fig. 12).
  — On rock outcrops, cliffs or blind leads where harvesting is uneconomical (Fig. 12).

Reserve tree selection guidelines

Helicopter logging

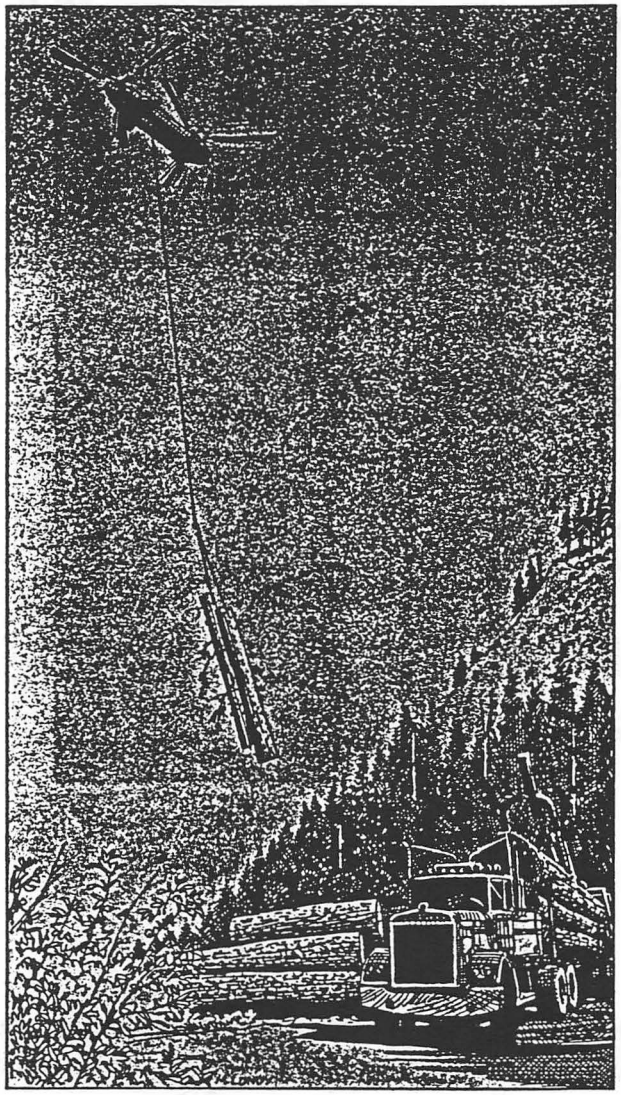

Fig. 20. — Helicopter logging.

Helicopter logging allows flexibility to leave reserve trees nearly anywhere in the unit because it can access logs from various directions (Fig. 20).

However, it creates special problems with rotor downwash, such as flying limbs and chunks.

Logs swinging against standing trees during log pick up may also dislodge portions of reserve trees. The hazard area may need to be enlarged to address this increased hazard.

Strategies for retaining reserve trees:

- Type 1 or 2 reserve trees can be left singularly or in clumps within the unit.
- Leaving safe trees within the hazard area of a Type 3 or 4 reserve trees (clumping) is an effective way to isolate workers from exposure to the hazard (Fig. 13).
- Hazard areas along the edge of the unit are easiest to avoid.

Reserve tree selection guidelines

Operational guidelines 1992

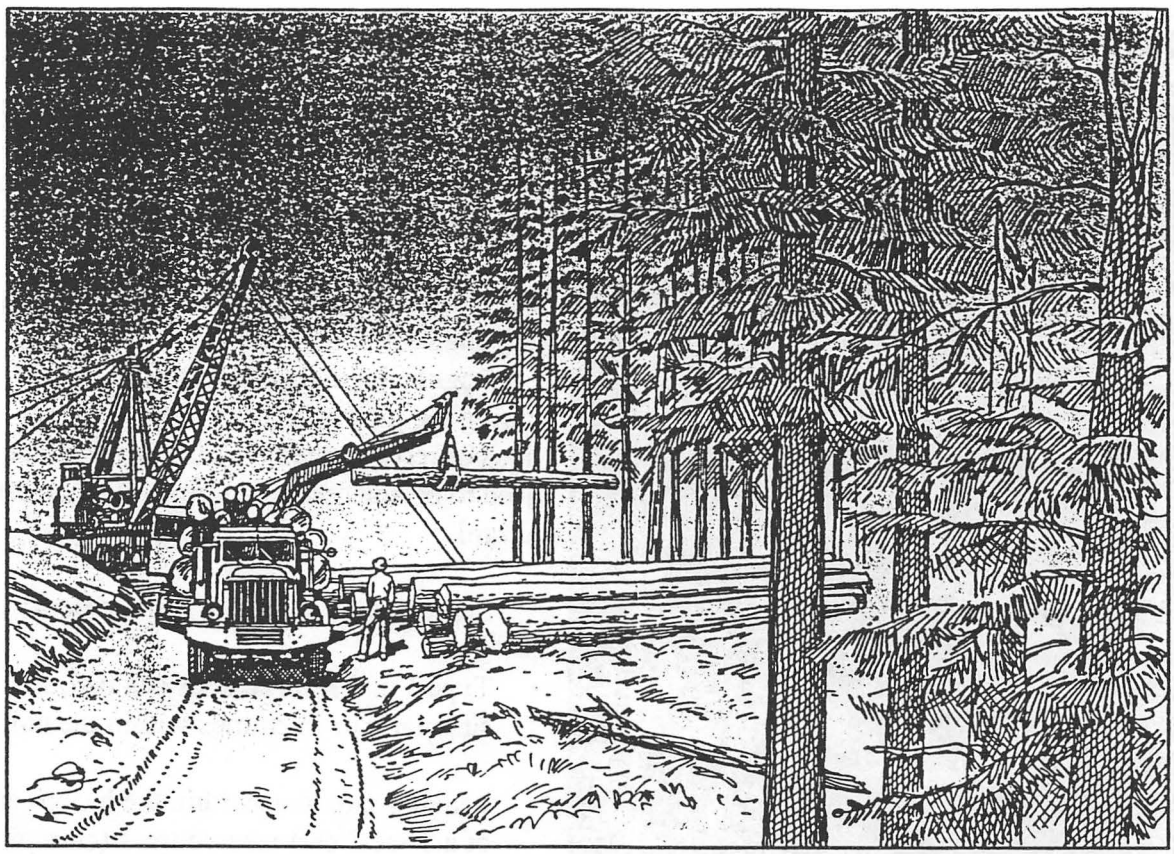

Fig. 21. — Reserve trees near roads.

Roads, road construction and landings

Snags along roads and landings can create dangerous working conditions.

Ground vibration from heavy equipment could cause unexpected collapse; snags could be bumped during road building or loading activities.

Consider long-range planning objectives when selecting reserve trees along a road. For example, a Type 2 reserve tree which leans toward a road may not be dangerous when selected, but will eventually become dangerous as it decays. It would then need to be removed.

Strategies for retaining reserve trees:

- Leave Type 3 or 4 reserve trees along roads or near landings if their hazard area does not extend into a work area, yarder lines or roadway (Fig. 21).
- On steep ground, the downhill side of corners can be a good place to leave trees or clumps.
- Type 1 or 2 reserve trees can be left along roads and near landings. Note: trees located on a cutbank with a weakened root system would be classed as a Type 4.

Reserve tree selection guidelines

Glossary

Danger tree: Any tree of any height, dead or alive, that poses a hazard to workers because of rot, root, stem or limb damage, lean, or any other observable condition created by natural process or man-made activity.

Exposure (to danger trees): A potentially unsafe condition that exists whenever a worker is within the hazard area around a danger tree during forest practices.

Forest practices: Any activity conducted on or directly pertaining to forest land and relating to growing, harvesting, or processing timber, including but not limited to road construction, harvesting, precommercial thinning, reforestation, fertilization, and brush control. "Forest practice" does not include preparatory work such as tree marking, surveying and road location.

Hazard area: The area on the ground around a tree that could be reached by any dislodged portion of that tree.

Mechanized felling: Falling of standing timber by a self-propelled, mobile-wheeled or tracked machine equipped with a shear or other powered cutting device.

Reserve tree: Trees which are reserved from cutting for a variety of purposes, such as wildlife, seed source, research, genetics and structural diversity.

Shovel/loader logging: The operation of gathering logs on a setting with log loading equipment, as opposed to gathering logs by cable yarding, ground skidding or other traditional methods. Shovel logging does not include "feller-buncher" type operations.

Snag: A dead standing tree or portion thereof.

Type 1 reserve tree: A live tree that is defective or deformed with sound roots, trunk and top.

Type 2 reserve tree: A dead tree with sound roots, trunk and top.

Type 3 reserve tree: A live or dead tree with sound roots and trunk, but with an unstable top.

Type 4 reserve tree: A tree with roots or trunk no longer sound.

Wildlife reserve tree: Any live defective, dead, damaged or dying tree which provides or has the potential to provide habitat for those wildlife species which use these trees to meet a crucial life need.

Work area: Any area that a worker may occupy while performing daily tasks.

DNR: Washington Department of Natural Resources.

L&I: Washington Department of Labor and Industries.

USFS: United States Forest Service.

APPENDIX H

DECISION MEMO - One Example Salvage
USDA Forest Service - One National Forest
One Ranger District

PURPOSE AND NEED:

Occasionally, localized winds are strong enough to blow over trees. Although any tree could potentially blow over if winds are strong enough, the most vulnerable trees are those adjacent to openings, dead, or of a species with inherently shallow roots. When this happens, scattered areas of windthrown dead timber result. Areas along One Rod, within and adjacent to existing cutting units, have been identified as having such blowndown timber.

Accumulations of dead, down sawtimber represent a fuel source which elevates fire related concerns, both natural and human-caused. Salvage harvesting of such timber would reduce the fuel loading, and offer better assurance that nearby managed and unmanaged stands would not be jeopardized from the start or spread of a wildfire in that fuel source, thereby sustaining forest health. Salvage harvesting also improves fire suppression capabilities, which provides for better protection of the natural resources as well as firefighting personnel. The occurrence of a large-scale wildfire would encourage a monoculture of lodgepole pine which would, at a later date, be pre-disposed to mountain pine beetle attack and subsequent risk of mortality. This sort of cycle would set the stage for repetitive large-scale wildfires approximately every hundred years. Large-scale wildfires often have undesirable effects including, but not limited to, a loss of timber inventory, a loss of wildlife cover habitat, reduced air quality due to unmanaged smoke, and potential watershed damage, as well as the monetary cost of fire suppression.

Local public interest has been expressed to salvage such dead trees through small timber sales to provide employment and income opportunities which contribute to the local economy.

Dead, down timber quickly loses its merchantability. Left unharvested, dead timber represents forgone social and economic opportunities. Recovery of dead timber while it is still merchantable would provide a marketable product to the timber products industry, which correlates to both direct employment/income opportunities as well as indirect and induced social and economic benefits.

> Direct, indirect, and induced social and economic benefits from salvage timber harvest are readily apparent at the local level. Direct social and economic benefits are represented by employment and income opportunities in the harvest and transport of the raw material to processing facilities. Indirect social and economic benefits are represented by employment and income opportunities at processing facilities and subsequent transport to the market place. Induced social and economic benefits are represented by employment and income opportunities in the service sector (ie. grocery stores, equipment suppliers, restaurants, etc.).

Social and economic benefits from salvage timber harvest also exist at a larger scale, although they are difficult to associate with any one project. Salvage of dead timber provides society with an opportunity to partially meet resource demands with a low risk of environmental impact, instead of seeking resource supplies elsewhere with potentially greater local and global effects. For example, if efforts are not made at the local and national level to meet society's consumptive resource demands, society may look at alternative product sources such as from the rain forest or countries with minimal environmental protection regulations, and potentially higher risks of environmental impact.

Salvage harvesting would also provide other beneficial activities that could be identified, funded, and implemented through a small timber sale: ie) rehabilitation of used existing landings and temporary roads by recontouring and seeding, road maintenance, and noxious weed control.

In summary, the Purpose and Need for this project is to:

1 **Reduce the potential for wildfire and improve suppression capabilities by removing dead timber from the area associated with Road 254, thereby sustaining forest health.**

2 **Provide social and economic benefits by salvaging the identified dead timber before it further degrades and loses value and merchantability.**

3 **Provide a means and funding source to accomplish area improvement work: ie) rehabilitation of existing landings and temporary roads by recontouring and seeding, road maintenance, and noxious weed control.**

PROPOSED ACTION:

The Proposed Action fully responds to the Purpose and Need.

The Proposed Action is to salvage harvest blowndown timber as indicated on the attached maps in Appendix 1 (Sections xxxxxxx, One County, One State). Approximately 100 thousand board feet of dead, down timber would be recovered.

Dead, down trees along One Road, within and adjacent to existing cutting units, would be harvested using a tractor skidding logging system. All skidding equipment would operate on the existing roads, skid trails, firelines, or landings.

All standing live and dead trees, except those needed to be cut for safety reasons, would remain after harvest.

No new roads are proposed and no constructed trails or landings are planned. Existing roads would be used for transporting the logs out of the woods. Logs must be hauled north via One Road which is an open road. Standard road maintenance requirements would be conducted by the Timber Sale Purchaser to protect the road and other resources. Additionally, since One Road is a native surface road, disturbed areas of exposed soil would be seeded to further protect the road and other resources. Any damage to roads would be repaired by the Timber Sale Purchaser. Existing landings and existing temporary roads, from previous activities, used in association with the salvage harvest would be recontoured and seeded. All created slash would be removed from the road right-of-way by the Timber Sale Purchaser. Safety signing to provide public users adequate warning of hazards and operations would be required by the Timber Sale Purchaser.

Since the dead, down trees are subject to rapid deterioration, harvest is proposed to start as soon as possible to recover the maximum timber value and volume. Sapwood decay and minor checking is already present. Warm summer weather is expected to accelerate the rate of checking, increasing its depth into the heartwood, thereby reducing the product value.

One Road is currently managed as closed to public use and would remain closed to the public. The Timber Sale Purchaser and Operator would be required to close and lock the gates behind themselves. Hunting and transporting of firearms, game, or hunters would be prohibited during the general big-game hunting season.

The Best Management Practices listed in Appendix 2 will be incorporated to protect the soil and water-related resources.

No timber harvest would be permitted within riparian areas or Streamside Management Zones.

No harvest would occur within old-growth stands.

State fire regulations would be adhered to for operations occurring during the proclaimed fire season.

The proposed salvage would provide the means and/or funding to accomplish sale area improvement work such as the rehabilitation of used existing landings and temporary roads by recontouring and seeding, road maintenance, and noxious weed control.

No other harvest is pending or planned in the area of this Proposed Action. Although the One Ranger District has an ongoing small timber sale program with similar salvage harvest activities District-wide, this project is not associated with any other timber sale identified at this time. The effects of this project are negligible, as are potential effects of similar projects. Cumulatively, the effects of this project in conjunction with other projects would be correspondingly negligible. Administrative activity work could occur as needed in the area with negligible effects.

DECISION:

It is my decision to implement the Proposed Action as presented. My decision is based on several factors including the contents of this Decision Memo, on-the-ground resource information, and supporting documentation:

1. **Purpose and Need.** The Proposed Action would fully meet the Purpose and Need.

2. **Public Input.** The Proposed Action is responsive to local public interest for salvage of such dead material through small timber sales, to provide employment/income opportunities which contribute to the local economy. The Proposed Action considers public input received during the comment period. Refer to the "Scoping and Public Involvement" section.

3. **Product Value Recovery.** The Proposed Action responds to a timber salvage emphasis since the dead, down timber will lose its merchantability. Continued decay of the sapwood is expected to occur. Warm summer weather further degrades the timber's value as it accelerates the depth of checking into the heartwood. Continued checking would reduce the product value from sawlog quality to chip material, with an associated stumpage price decline. Sawlogs have an approximate current value of $250 per thousand board foot, while chips have an approximate value of $10 per thousand board foot. This reflects a substantial potential net loss to the U.S. Treasury and return receipts to the County.

4. **Social and Economic Benefits.** The Proposed Action provides desirable social and economic benefits at various scales as summarized in the Purpose and Need.

5. **Area Improvement Work.** The Proposed Action is an effective way to accomplish the identified area improvement work (existing landing and temporary road rehabilitation, road maintenance, and noxious weed control) with inherent benefits.

6. **Fuel Accumulations and Fire Risk.** The Proposed Action would reduce the undesirable fuel accumulations and lead to a decline in fire risk. The Proposed Action would also improve suppression capabilities, which provides for better protection of the natural resources as well as firefighting personnel.

7. **Low Risk of Environmental Impact.** The Proposed Action is limited in scale and duration. Since there is no other current or planned timber harvest in the area, further discussion of cumulative effects is not necessary. Anticipated effects are expected to be minimal as summarized in this document.

Geology and Soil: Since no new roads, landings, skid trails, or fire-lines would be constructed, there would be minimal soil disturbance. Timber harvest using such existing features would therefore be expected to have negligible impacts to the soil resource, provided equipment operates from such established features. Measures such as seeding disturbed areas of soil on One Road's native surface, rehabilitation of used existing landings, existing temporary roads, and road maintenance are beneficial to the soil resource.

Water, Riparian, and Fisheries: Timber harvest using existing roads and trails would have negligible impacts on water-related resources. The proposed salvage harvest would have a minimal effect on water yields. The harvest of dead, down trees would result in no notable change in water yield for the following reasons: 1) activity would operate from existing roads and trails, 2) minimal area would be impacted, and 3) the dead, down trees proposed for harvest do not evapo-transpire or contribute to forest water uptake. No significant change in runoff patterns would be expected as areas of dead, down timber are usually small and scattered with adequate interspersed vegetation to minimize water and soil movement. With minimal soil disturbance and low likelihood of changes in water yields and runoff patterns, water-related resources should be adequately protected. The use of the identified Best Management Practices, and excluding harvest from Streamside Management Zones and riparian areas, further ensures water-related resource protection. Measures such as seeding disturbed areas of soil on One Road's native surface, rehabilitation of used existing landings, existing temporary roads, and road maintenance are beneficial to the water-related resources. Seeding disturbed areas of exposed soil on One Road would help hold soil on the site and reduce the risk of sediment reaching a stream. Rehabilitation of used existing landings and temporary roads through recontouring and seeding would improve infiltration, help hold soil on the site, and ultimately reduce the risk of sediment reaching a stream. Road maintenance also reduces the risk of sediment reaching a stream.

Fuels and Wildfire Risk: The harvest of dead, down trees would be expected to reduce the likelihood of a wildfire ignition. The rate of spread, should a wildfire start, would also be reduced because dead trees would be removed and the harvest-created openings would interrupt fuel continuity. Reducing the amount of fuel and fuel continuity improves fire suppression capabilities and offers better assurance that nearby managed and unmanaged stands would not be jeopardized from the start or spread of a wildfire. The removal of trees blocking the roadway into harvest areas also improves suppression abilities. Improved fire suppression not only contributes to protecting natural resources, it helps protect fire fighting personnel as well. If a wildfire were to occur, the fuel reduction achieved by harvesting dead trees and improved suppression capabilities would lessen the potential magnitude of a wildfire and its effects. Large-scale wildfires often have undesirable effects including, but not limited to, a loss of timber inventory, a loss of wildlife cover habitat, reduced air quality due to unmanaged smoke, and potential watershed damage, as well as the monetary cost of fire suppression and personal risk. The occurrence of a large-scale wildfire would likely encourage a monoculture of lodgepole pine which would, at a later date, be pre-disposed to mountain

pine beetle attack and subsequent risk of mortality. This cycle would set the stage for repetitive large-scale wildfires about every hundred years.

Air Quality: The Proposed Action would use equipment run on petroleum products, such as diesel and gasoline. Emissions within Federal and State standards are expected with the use of such equipment. A minor amount of localized dust would be expected from harvest equipment and log trucks. Long-range transport of dust is not expected. Road-dust abatement would occur as needed to ensure impacts remain localized.

If the Proposed Action were not to occur, there would be more fuel available to increase the intensity of a wildfire, should a start occur. An intense wildfire would generate high levels of emissions, such as experienced in Eureka during the Dry Forks Fire during September 1988. Particulate levels, exceeding National maximum levels, were readily discernible as the town of Eureka was darkened with a slowly settling layer of suspended soot. The amount of airborne particulates from that wildfire were so high that vehicles were driving with their lights on during the day.

Climate: Maintenance of healthy forest ecosystems through timber management should not alter natural climatic patterns. Since dead trees do not evapo-transpire, their removal should not alter climatic patterns. Harvesting dead trees which could otherwise fuel a wildfire would reduce potential wildfire-caused emissions which potentially could, in some currently unknown way, affect climatic patterns.

Vegetation: Harvesting dead, down trees should negligibly alter the existing vegetative condition. Standing live and dead timber would remain on the site as available biomass which could contribute to woody debris for nutrient cycling and site productivity. Harvesting dead, down timber may slightly open-up the site, thereby stimulating regeneration, grasses, or browse. The risk of increased noxious weeds is no greater from the Proposed Action than from other public and Agency use of roads across the Forest. However, noxious weed control is incorporated into the Proposed Action to minimize weed-related concerns.

Wildlife/Range/Biodiversity: The scale of activity, both in size and duration, is expected to have minimal effects upon wildlife.

Since dead, down trees represent small openings, their removal should not measurably increase fragmentation or edge. The amount of edge habitat before and after the salvage harvest should be similar.

Harvesting dead, down trees could improve the forage availability for wildlife through grass and brush stimulation. The area of proposed activity is not within any range allotment and does not receive commercial livestock use.

The area of the Proposed Action is designated in the Forest Plan as Management Area 15. "Wildlife habitat effectiveness and security will be maintained by limiting the number of miles of open road road to 3 miles per square mile or less" (Forest Plan, Management Area 15 Wildlife Standard #2, pg. III-65). The Proposed Action would not exceed an open road density of 3 miles per square mile. Since dead, down trees represent small openings, their removal should not notably reduce security.

The Proposed Action would comply with the Endangered Species Act, as well as Agency regulations, to ensure adequate protection is provided for Threatened and Endangered species (refer to the Biological Evaluation in Appendix 3).

Although salvage of dead lodgepole pine would decrease suitable specific habitat for the black-backed woodpecker, populations are not expected to be adversely affected. Implementation of the Proposed Action complies with the Agency regulations to ensure that adequate protection is provided for Sensitive species (refer to the Biological Evaluation in Appendix 3).

Riparian values would be protected by excluding harvest from riparian areas and Streamside Management Zones.

The removal of dead, down trees represents a loss of a specialized habitat (wildlife tree habitat-snags) which could be interpreted as a small-scale site-specific reduction in biodiversity. However, standing live and dead timber would remain on the site, adjacent uncut areas and trees would continue to provide some degree of wildlife tree habitat, and the Proposed Action would meet Cavity Habitat Management Guidelines to maintain wildlife tree levels at or above 40% (3 snags/replacement per acre). This should insure that species which depend on cavity habitat, such as the pileated woodpecker, could maintain viable populations through time.

Heritage Resources: The Proposed Action would not affect heritage resources.

Recreation/Trails: The Proposed Action is located along a closed road, away from trails or other commonly used areas. There should be minimal effects to the recreation resource. The most prevalent potential effect could be the presence of increased traffic and the sounds of harvest activities. Recreationists would be protected through the use of required safety signing. Those individuals wishing to cut firewood should be able to find ample opportunities elsewhere on the District's open roads.

Visuals: The extent of trees harvested by the Proposed Action would be at such a limited scale that changes to the visual resource would be minimal. The nature of the Proposed Action, removing down trees along a road closed to public use, further ensures that public viewing should not be affected. Some people, although not all, may feel that the removal of dead trees actually improves the visual resource.

Social and Economics: The Proposed Action would have social and economic benefits as presented in the Purpose and Need and Appendix 4.

No "extraordinary circumstances" exist (refer to the section "Reasons For Categorically Excluding the Proposed Action").

8. **Negligible Conflicts with Firewood Cutting Opportunities.** The Proposed Action is on a road managed as closed to the public. With or without the Proposed Action, the area would not be accessible by vehicle to firewood cutters. The Proposed Action would also include the recovery of tree species susceptible to blow down such as spruce and alpine fir, which are usually not preferred by firewood cutters. With the extent of mountain-pine-beetle caused lodgepole pine mortality, there are ample opportunities to cut firewood elsewhere on open roads across the District.

9. **Alternatives Considered.** Alternatives of no-action and salvage harvest of the windthrown timber were considered. Although the no-action alternative is viable, it would not address the concerns and need for management expressed in the Purpose and Need. The no-action alternative also would not accomplish any desirable sale area improvement work. Salvage harvest of windthrow timber is presented and analyzed as the Proposed Action. Although requested by a commenter, alternatives focusing entirely on fish and wildlife habitat improvements, road obliteration rather than closures, watershed rehabilitation, and erosion control were not considered in and of themselves, as they do not respond to the identified Purpose and Need.

SCOPING AND PUBLIC INVOLVEMENT:

Past public input shows strong desire to salvage wind-thrown timber and dead trees while reducing the emphasis on clearcutting, both locally and elsewhere.

Scoping of the Proposed Action was made through legal notices i One newspaper, a seventy-one person/group mailing describing the Proposed Action and requesting comment, an Open House held at the One Ranger District on One day, and the Forest's Quarterly Schedule of Proposed Actions (234 person/group mailing). All comments received have been considered in this project as noted below.

Summary of Public Comment:

Eleven people attended the Open House held for this project on One day, 1994. All attendees were supportive of the proposed timber salvage. Many also took the opportunity to express their concern for rapid and continued salvage of dead and down timber, as this represents their livelihood and constitutes sound resource management. The District recognizes their concerns, and through such projects like this one, attempts to provide the social and economic benefits they seek while applying sound resource management.

A phone call was taken from ABC Group on One day, 1994 asking about the project. The Planning Forester explained that we were currently accepting comments and urged them to provide input. A follow-up letter thanking them for their phone call and re-stating solicitation of their input was mailed to them One day, 1994. No additional involvement on their behalf has occurred regarding this proposal.

One letter was received expressing concern that this proposal would "practically stop all firewood cutting by the people" (Project File, One person, postmarked April 11, 1994). The Proposed Action is along a road presently managed as closed to the public. With or without the Proposed Action, the area would not be accessible by vehicle to firewood cutters. Should vehicular traffic be provided to the public in the future, all of the standing dead trees would remain and be available to firewood cutters. Additionally, the Proposed Action includes the recovery of tree species susceptible to blow down, such as such as spruce and alpine fir, which are usually not preferred by firewood cutters. With the extent of mountain-pine-beetle caused lodgepole pine mortality, there are ample opportunities to cut firewood elsewhere on open roads across the District.

A five-page letter of comment was received from Another Group (Project File, Another Group, postmarked May 5, 1994).

> The Another Group does not believe project documentation in Decision Memos provides enough information to make a reasoned decision, and suggests the Forest Service do an environmental assessment or environmental impact statement for every development proposal. Consistent with the Agency's direction on the use of Decision Memos to document categorical exclusions, the District disagrees with that belief. This Decision Memo and supporting information provides the Responsible Official, as well as others, the depth of detail necessary to make a reasoned and informed decision. Decision Memos are intended to disclose routine actions within specified categories in the absence of extraordinary circumstances which would not prompt documentation in an environmental assessment or environmental impact statement (refer to the following section "Reasons For Categorically Excluding The Proposed Action"). The use of categorical exclusions documented in Decision Memos reduces needless paperwork, analysis of insignificant effects, and encyclopedic review of actions where the effects are clearly understood. The suggestion to document every proposal in an environmental assessment or environmental impact statement would be beyond the legislative intent of NEPA, and is counterproductive as it would divert the Forest Service's finite resources from other projects where such documentation is warranted.

The Another Group also requested analysis of several items, not all of which are relevant to this Proposed Action, to be disclosed in an EA. The requested additional information or analyses fall into the following categories: economics and net public benefit; validation of Forest Plan assumptions; wildlife; water quality and fisheries; timber resource; cumulative effects; reforestation; soils; visual/aesthetic quality; fire suppression; biological corridors; and alternatives for consideration. Although their comments are not site-specific to this Proposed Action, and the wording of their letter and items requested are similar to those requested for various other projects across the Forest, the District considered each of their comments in detail (see Appendix 4).

In an attempt to do a thorough and proper analysis of the Proposed Action, the District has contacted the Another Group to obtain project specific comments (see Appendix 5).

The Another Group chose not to provide more detailed input, but instead expressed belief that their initial comments warrant response (see Appendix 6). The District does not disagree with the need to respond to all public comments, including those submitted by the Another Group, and has done so as indicated above. The nature of these responses however is commensurate with the general nature of their comments provided. Had the Another Group submitted more detailed comments, the District could have provided more detailed responses.

Additional written comments were supportive of the project (Project File. Comment Forms: Another Person and Yet Another Person, Letter: One Business).

The core interdisciplinary team members include a Forestry Technician (leader), Wildlife Biologist, Archaeologist, and Planning Forester. Additional specialist support has been provided by a Civil Engineer Technician and Hydrologist. Supporting interdisciplinary efforts included project review and input by the District Staff (which includes a Wildlife Biologist, Silviculturist, Fuel Management Officer, Timber Management Officer, and a Civil Engineer).

REASONS FOR CATEGORICALLY EXCLUDING THE PROPOSED ACTION:

It is the consensus of the District Staff, and my determination, that the Proposed Action may be categorically excluded from further National Environmental Policy Act documentation based on the following agency direction and absence of extraordinary circumstances:

The Chief of the Forest Service has identified that: 'Timber harvest which salvages less than one million board feet of timber; requires less than one mile of road construction; and assures regeneration where required', may be categorically excluded from documentation in an environmental assessment or environmental impact statement, if no extraordinary circumstances exist related to the Proposed Action (Chapter 30, Federal Register, September 18, 1992).

I have decided that this project is within the context of activity as defined by the Chief and have concluded that there are no extraordinary circumstances involved with this proposal as recapped below:

a) The terrain is not steep and the soils are not erosive. This is strongly supported by successful past harvest adjacent to the Proposed Action. Additionally, the Proposed Action has been designed to minimize impacts to the soil resource by operating from existing roads, skid trails, firelines, and landings. However, any ground disturbing activity has the potential to displace localized areas of soil (Chapter IV of Volume 2 of the Final Environmental Impact Statement for the Forest Plan presents a summary of relevant soil-related effects associated with logging systems (pgs. IV-13, 14, 15, 26, 27, 28, 31, 35, 26, 40, 41)). The use of the identified Best Management Practices and other measures help protect the soil resources. Based on similar soil, parent material, land form, and vegetation, the Forest uses landtypes as the basic method of describing the soil resource. Further analysis shows that the Proposed Action would be within three landtypes identified in the 1984 Kootenai National Land System Inventory: 532 rounded sideslopes, 353 rounded ridgetops, and 355 convex mountain slopes. These landtypes do not have elevated soil-related concerns (Project File communication with Forest Soil Scientist, 3/29/93).

b) The Proposed Action is not likely to have adverse effects on Threatened or Endangered species. Further details are contained in the Biological Evaluation (Appendix 3).

c) The Proposed Action is not located in any flood plain, wetlands, or municipal watershed. This was validated by site-review of the identified areas by the interdisciplinary team leader.

d) The Proposed Action is not in any Congressionally designated area such as wilderness, wilderness study area, or National Recreation Area.

Existing wilderness on the Forest is represented by Management Area 7 as defined in the Forest Plan (Forest Plan, pgs. III-21 to III-25). Management Area 7 is composed entirely of the Cabinet Mountains Wilderness Area which is administered by the Cabinet, Libby, and Troy Ranger Districts. The Proposed Action is within Management Area 15.

Recommended wilderness and wilderness study areas are represented by Management Areas 8 and 9, respectively, as defined in the Forest Plan (Forest Plan, pgs. III-26 to III-37). Management Area 8 identifies three areas recommended by the Forest for Congressional designation as wilderness: Scotchman Peaks, Cabinet Additions, and Ten Lakes Contiguous Area. None of these are located on the One Ranger District. Management Area 9 represents an area identified by the Montana Wilderness Study Act associated with the Ten Lakes area. This is not located on the One Ranger District.

There are no National Recreation Areas identified on the Forest.

e) Focused around an existing road, the Proposed Action is not part of an inventoried roadless area (refer to Appendix C of the Forest Plan Final Environmental Impact Statement for details regarding the Forest's Inventoried Roadless Areas).

f) The Proposed Action is not part of a Research Natural Area. Candidates for Research Natural Areas are represented as a part of Management Area 21 as defined in the Forest Plan (Forest Plan, pgs. III-90 to III-95). Eight land areas and 4 aquatic areas are identified. The four aquatic sites are all within the Cabinet Mountains Wilderness Area. Of the 8 identified land areas, one is located on the One Ranger District, near the mouth of Big Creek adjacent to the west side of Koocanusa Reservoir and the Forest Development Road. The Proposed Action is not situated near this area.

g) The Proposed Action would not affect any known cultural resource sites. A cultural resource survey and overview have been completed (Report No. 94-KO-1-06, see Project File). No cultural resources were located and no protection measures were recommended. This report was sent to the State Historic Preservation Office. The State Historic Preservation Office concurs with the report's finding. Therefore, in accordance with the Memorandum of Understanding Between the Forest Service (Northern Region) and the State Historic Preservation Office regarding Cultural Resource Identification and Inventory, no additional field inventory or project specific consultation need occur.

Additionally, I have incorporated consideration of other elements in my determination that there would be no 'extraordinary circumstances'. I have considered the potential for cumulative effects and arrived at the conclusion that without notable individual effects from the Proposed Action, and the absence other harvest in the area, there would be no significant cumulative effects. My conclusion is based on: the small scale and duration of activity constituting the Proposed Action, the low risk of environmental impact, the minimal visual and environmental change expected, and the possibility of minor administrative use which could occur regardless of project implementation.

FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS:

National Historic Preservation Act. The Proposed Action would not affect any known cultural resource sites. A cultural resource survey and overview have been completed (Report No. 94-KO-1-06). No cultural resources were located and no protective measures were recommended. This report was sent to the State Historic Preservation Office. The State Historic Preservation Office concurs with the report's finding. Therefore, in accordance with the Memorandum of Understanding Between the Forest Service (Northern Region) and the State Historic Preservation Office regarding Cultural Resource Identification and Inventory, no additional field inventory or project specific consultation need occur.

Endangered Species Act. The District Wildlife Biologist evaluated the Proposed Action in regards to the Endangered Species Act (see Biological Evaluation in Appendix 3). The conclusion of this analysis is that implementation of the Proposed Action would have No Effect on bald eagles, peregrine falcons, white sturgeon or water howellia, and it Is Not Likely To Adversely Affect grizzly bears or gray wolves that occur or are suspected to occur on the Kootenai National Forest. With the current information available, implementation of the proposed federal action will have No Impact on Coeur d'Alene salamanders, torrent sculpins, northern golden-carpet, western boneset or kidney-leaved violets, and it May Impact Individuals But Will Not Contribute To A Trend Towards Federal Listing Or A Loss Of Population Viability for lynx, Townsend's big-eared bats, boreal owls, flammulated owls, black-backed woodpeckers, westslope cutthroat trout, bull trout, fringed onion, common clarkia, Howell's gumweed or Geyer's biscuit-root that occur or are suspected to occur on the Kootenai National Forest.

Montana Streamside Management Zone Act. The Proposed Action does not include streamside management zones pertaining to this Act.

National Forest Management Act. The National Forest Management Act and accompanying regulations require that several specific findings be documented at the project level:

Forest Plan Consistency. Management activities are to be consistent with the Forest Plan {16 U.S.C. 1604(i)}. The Forest Plan guides management activities {36 CFR 219.1(b)}. The Proposed Action is consistent with Forestwide and Management Area direction.

Suitability for Timber Production. No timber harvest, other than salvage sales or sales to protect other multi-use values, shall occur on lands not suited for timber production [16 U.S.C. 1604 (k)]. No harvest has been scheduled on unsuitable land. The on-the-ground conditions fit with Management Area 15 goals described in the Forest Plan and the classification of "suitable for timber management" is appropriate, supported by other successful harvests in the area and ground verification.

Clearcutting and Even-age Management. When timber is to be harvested using an even-aged management system, a determination that the system is appropriate to meet the objectives and requirements of the Forest Plan must be made, and where clearcutting is to be used, it must be determined to be the optimum method [16 U.S.C. 1604(g)(3)(f)(i)]. The Proposed Action is not a clearcut or even-age management system. The Proposed Action is considered to be a salvage method. This method is appropriate to meet the objectives and requirements of the Forest Plan.

Vegetation Manipulation. All proposals that involve vegetation manipulation of tree cover for any purpose must comply with the seven requirements found in 36 CFR 219.27(b). Management practices shall:

Be best suited to the goals stated in the Forest Plan. The Proposed Action is responsive to Forestwide direction to produce a programmed yield of timber contributing to a sustained yield of timber responsive to National and Regional needs, scheduled to encourage a stable base of economic growth in the dependent geographical area (Forest Plan, Forestwide Goal #1, pg. II-1), and to protect Forest users, property, and resources from wildfire (Forest Plan, Forestwide Goal #24, pg. II-2). The Proposed Action is also responsive to the goals of the Management Area it is within Management Area 15. The goals of Management Area 15 are to focus upon timber production while providing for other resource values (Forest Plan, Management Area 15 Goal Statement, pg. III-64). The Proposed Action does not negate other resource values and would produce a timber product within Management Area Standards.

Assure that technology and knowledge exists to adequately restock lands within five years after final harvest. The Proposed Action is not a final harvest, therefore this criteria does not apply. Only a portion of the stand, merchantable down, dead timber, would be removed. The standing, live and dead trees would remain. Reforestation is not appropriate in this context. The size of salvaged areas are small and scattered, with correspondingly small resulting openings expected. Although not required, the scarification resulting from the salvage could create a seed bed conducive to foster natural regeneration.

Not to be chosen primarily because they give the greatest dollar return or the greatest output of timber (although these factors shall be considered). This decision is governed largely by resource management conservation and protection needs as discussed elsewhere in this document. The association to economics and timber outputs, however, has also been considered. Similar small sales have been successful in the past and are expected to continue as such. The Proposed Action, in addition to contributing to resource management and protection needs, would produce an output of timber which would otherwise be foregone as dead timber rapidly loses its merchantability. This product recovery has direct, indirect, and induced social and economic benefits at various scales as summarized in the Purpose and Need.

Be chosen after considering potential effects on residual trees and adjacent stands. These considerations have been made and are incorporated into the Proposed Action. The proposed harvest consists of the removal of dead, down timber: all residual trees would remain after harvest. Some inadvertent damage to residual trees may occur from being bumped by the trees skidded for salvage harvest. This damage is expected to be minor. The fire hazard reduction accomplished through the removal of such down timber should help assure protection for the residual trees and adjacent stands. Various discussions of minimal resource effects are disclosed in this document. The potential for site damage is reduced through the use of existing facilities with incorporated Best Management Practices.

Be selected to avoid permanent impairment of site productivity and to ensure conservation of soil and water resources. The Proposed Action would maintain site productivity as well as conservation of the soil and water resources. Harvest of the localized areas of down, dead timber would leave adequate non-merchantable woody debris, as well as standing live timber, for nutrient cycling. The use of Best Management Practices further protects site productivity and ensures conservation of the soil and water resources. Logging trucks and equipment would minimize site impacts by using existing facilities.

Be selected to provide the desired effects on water quality and quantity, wildlife and fish habitat, regeneration of desired tree species, forage production, recreation users, aesthetic values, and other resource yields. The Proposed Action provides the desired effects on other resources. Refer to 'item 7' on pages 3-5 of this document.

Be practical in terms of transportation and harvesting requirements and total costs of preparation, logging, and administration. The Proposed Action has been field reviewed to ensure that it is practical. Roads for transportation already exist. Their condition is acceptable for safe use. No additional work or expenses above typical road maintenance requirements is expected. The Proposed Action is limited in its scale of activity and complexity. Sale preparation and administration cost are expected to be minimal. As experienced with past harvest activity in the area, the Proposed Action is practical in terms of logging.

ADMINISTRATIVE REVIEW AND IMPLEMENTATION DATE:

This project is subject to further review under the provisions of 36 CFR 215. An appeal of this decision must be postmarked and submitted to the Regional Forester (Appeal Deciding Officer), Federal Building, 200 East Broadway, P.O. Box 7669, Missoula, MT. 59807, within 45 days of the date of publication in the Daily Interlake newspaper (by _____ __, 1994) in accordance with 36 CFR 215.11, 215.13, and 215.14. Project implementation may occur as early as, but not before, 5 business days from the close of the appeal filing period.

CONTACT PERSON:

Further information about this decision can be obtained from either me or One Forester (One Ranger District, One Address, phone: #######).

_____ _____

One Ranger
District Ranger - Responsible Official

Date

BEST MANAGEMENT PRACTICES

A. INTRODUCTION

Best Management Practices (BMPS) are preventive practices to protect the soil and water resources. They are the primary mechanism to enable the achievement of water quality standards (Environmental Protection Agency, 1987). BMPS include, but are not limited to, structural and non-structural controls, operations, and maintenance procedures. BMPS can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation). Usually BMPS are applied as a system of practices rather than a single practice. BMPS are selected on the basis of site specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The Forest Plan states that "Soil and water conservation practices, as outlined in the Soil and Water Conservation Practices Handbook (Forest Service Handbook 2509.22, May 1988), will be incorporated into all land use and project plans as a principal mechanism for controlling non-point pollution sources; meeting soil and water quality goals; and to protect beneficial uses." (Kootenai National Forest Plan, p. II-23). Montana State Water Quality Standards require the use of Reasonable Land, Soil, and Water Conservation Practices (analogous to BMPS) as the controlling mechanism for non-point pollution. Use of BMPS is also required in the Memorandum Of Understanding between the Forest Service and the State of Montana as part of our responsibility as the Designated Water Quality Management Agency on National Forest lands.

The Practices described herein are tiered to the practices in the Forest Service Handbook 2509.22 "Soil and Water Conservation Practices Handbook". They were developed as part of the NEPA process (National Environmental Protection Act), with interdisciplinary involvement, and meet Forest and State water quality objectives.

B. IMPLEMENTATION PROCESS

In cooperation with the State, the Forest Service's primary strategy for the control of non-point sources is based on the implementation of preventive practices (BMPS) determined necessary for the protection of beneficial uses. The Forest Service Non-point Source Management System used by the One Ranger District for small salvage sales consists of five steps as outlined below:

1. **SELECTION AND DESIGN** (Responsibility: Interdisciplinary Team)

    1. Appropriate BMPS selected.

    2. BMPS documented with explanation and possible TSC provisions.

2. **APPLICATION** (Responsibility: Presale Forester)

    1. Review corresponding documentation.

    2. Incorporate BMPS on-the-ground, (coordinating with other resource specialists).

    3. Prepare contract to address BMP needs and appropriate provisions.

    4. Fill out a Forest BMP form and file in sale folder.

3. **IMPLEMENTATION MONITORING** (Responsibility: Administrator, District Team)

    1. Fill out BMP form as unit is accepted and at end of season for those still open.

    2. District Team review of random projects.

4. **EFFECTIVENESS MONITORING** (Responsibility: Administrator, District Team, Forest)

    1. For multiple season projects, Administrator fill out BMP form.

    2. District Team review of projects at random.

    3. Forest review bi-annually scheduled by Staff of the Supervisor's Office.

5. **FEEDBACK LOOP** (Responsibility: Monitoring Coord./Hydrologist, Administrator)

    1. Monitoring Coordinator/Hydrologist collects and reviews BMPS.

    2. Work needs noted and scheduled for follow-up.

    3. Administrator notified of patterns of deficiency.

    4. BMPS submitted by Monitoring Coordinator to Forest for further review.

ADMINISTRATIVE APPEAL RULE 215
IMPLEMENTATION OF EMERGENCY ACTIONS
EXEMPTING EMERGENCY ACTIONS FROM STAYS OF IMPLEMENTATION
PROCEDURE FOR REQUESTING EXEMPTION OF STAY OF IMPLEMENTATION

The following discussion provides an overview of current direction relevant to the need for exemption of the "stay of implementation" for emergency actions. Unlike appeal rule 217, rule 215 does not provide for exemptions from an "appeal". The exemption applies only to the "stay" of implementation (36 CFR 215.10). There is no exemption from NEPA or from the public notice/comment period. However, exemption from "stay" has the potential to reduce project implementation time by 105 days. The Chief has the authority to determine what emergency situation exists that requires urgent action and warrants exemption from "stay of implementation".

The exemption from stay can be granted only by the Chief. Paragraph (d)(1)(i)-(iv) defines emergency and cites examples. The examples of an emergency given in {215.10 are not intended to be all-inclusive in recognition that the Chief needs discretion to determine when an emergency exists. Paragraph (d)(2) of this section of the rule requires the Responsible Official to notify the public that the agency intends to handle the action as an emergency as part of its notice of the proposed action. Examples of how the Forest Service may respond to emergency situations are discussed in section 215.10(d)(2).

{215.10 Implementation of decisions. (text from rule)

(d) A project decision is not subject to a stay if the Chief of the Forest Service determines that an emergency situation exists with respect to the decision in accordance with the following provisions of this paragraph:

(1) An emergency, as defined here, is an unexpected event, or a serious occurrence or a situation requiring urgent action. Examples of an emergency include, but are not limited to, the following:

(i) Vegetation loss which presents an immediate threat of flooding or landslide.

(ii) Hazardous or unsafe situations as a result of wildfire or other circumstances.

(iii) Damage to water quality caused by siltation due to fire or flooding.

(iv) Potential loss of fish and wildlife habitat due to windstorms and blowdowns.

(v) Sudden outbreaks of forest pests and diseases.

(2) The Responsible Official shall notify the public that the Forest Service intends to handle this project as an emergency in the public notice on proposed actions as provided in {215.5(c)(1). Actions responding to emergency situations may be accomplished with force account (Forest Service crews), service contracts or timber sale contracts.

PROCEDURE FOR REQUESTING EXEMPTION FROM STAY OF IMPLEMENTATION

In order to implement provisions for requesting an exemption from stay, the Forest Supervisor should document that good cause exists for an emergency exemption. The Forest Supervisor should prepare a formal request to the Regional Forester. Exemption requests should be prepared on specific proposed projects and include a complete discussion about the proposed action, (purpose and need). The request should address the severity of the past, present, and future impacts to resource values and discuss how immediate project implementation will mitigate environmental consequences.

The Regional Forester will review the request and make a formal request for exemption to the Chief.

POSSIBLE TIMELINE FOR REQUESTING EXEMPTION

- Initial analysis indicates that emergency exists;
- Scoping documents state that Forest will seek possible exemption from Chief;
- Forest proceeds with NEPA analysis and verifies the need for exemption for stay;
- Upon verification that need exists, Forest prepares formal request and forwards to Regional Forester;
- Regional Forester reviews request and makes formal request for exemption to Chief;
- Chief determines that emergency exists and approves request (approx. 2 weeks);
- Forest Supervisor advises public that exemption of stay has been granted by Chief through legal notice in newspaper for 30-day notice and comment (or for Draft EIS if applicable);
- Forest reviews and documents public comment, signs decision document and publishes legal notice in newspaper indicating that exemption of stay has been granted and that the decision will be implemented immediately;
- If appeals are filed, follow procedures of 36 CFR 215 to process appeal(s).

PURPOSE AND NEED

The present condition of the Project Area does not meet long-term objectives of the Kootenai Land and Resource Management Plan (Forest Plan). Natural processes occurring in the Project Area - particularly mountain pine beetle activity and subsequent mortality of lodgepole pine trees - have changed and are changing the character of the area and directly affecting its future condition. The objective of this project is to use timber harvest and associated activities as a means of moving towards the desired condition indicated in the Forest Plan. Key aspects of the purpose and need for this project are outlined below.

Obtain adequate timber growth and improve long-term productivity.

Mountain pine beetle activity is occurring in the area. Lodgepole pine is considered 'high risk' for mountain pine beetle attack when it exceeds 80 years of age, is larger than 8 inches in average diameter at breast height, and is growing below 5,400 feet elevation at 48 degrees north latitude. Currently, 55% (2,079 acres) of the suitable timberland acres in the Project Area meets this high risk criteria. Approximately 40% has already realized mortality rates of 90% or higher. Lodgepole pine mortality and reduced tree vigor has already and is continuing to occur. Timber growth and productivity is less than optimal on these sites due to extensive mortality of lodgepole pine and subsequent understocking. The void of timely establishment of commercial tree species in the understory of these lodgepole pine stands reduces the assurance of adequate timber growth and long-term productivity.

The desired future condition to move towards is one in which appropriate stocking levels are sustained over time. This is consistent with Forestwide Management direction to provide a sustained yield of timber responsive to National and Regional needs, scheduled to encourage a stable base of economic growth in the dependent geographical area (Forest Plan, Goal #1, page II-1).

The Proposed Action would move the area toward the desired future condition by harvesting and reforesting understocked and 'high risk' lodgepole pine stands to re-establish healthy stands of trees which otherwise would not be achieved naturally in the near future. Additionally, the establishment of a diverse forest through site-preparation followed by reforestation of mixed coniferous tree species promotes a forest more resilient to insect and pathogen activity to further ensure long-term productivity.

Reduce the risk of a catastrophic wildfire and its effects.

Dead and dying lodgepole pine trees pose a potential fire threat to the forest in the future. With the present and increasing amounts of dead timber, the occurrence of a large-scale wildfire could affect vast acreages of timber beyond those timbered areas already dead, dying, and at 'risk'. As a result of natural processes, dead lodgepole pine will fall to the ground in 5 to 10 years. This will develop extensive areas of heavy fuel loadings. Fuel loadings in the Project Area range from 5-30 tons per acre, and are expected to increase to 100-150 tons per acre if the mountain pine beetle activity continues as predicted. Such elevated fuel levels could predispose the area to large stand replacement wildfires. The effects of a large-scale wildfire are not desirable. Undesirable effects include, but are not limited to: a loss of timber inventory, a loss of

wildlife cover habitat and delayed return of wildlife cover, and potential watershed damage. Additionally, stands developing from this sequence would consist predominantly homogeneous stands of even-aged lodgepole pine which would set the stage for the continuance of a cyclic wildfire pattern.

The desired future condition to move toward is one in which the area is not predisposed to a catastrophic wildfire. This includes a reduction in both the present fuel loadings and 'high risk' lodgepole pine continuity. This is consistent with Forestwide Management Direction to protect Forest users, property, and resources from wildfire (Forest Plan, Goal #24, page II-2).

The Proposed Action would move the area toward the desired future condition by reducing the potential for catastrophic wildfires and their effects. Salvage harvest and site preparation would directly reduce existing and potential fuel loadings. Such activity would also interrupt the horizontal continuity of fuel loadings created by areas of dead, dying, and 'high risk' lodgepole pine. Reforestation promotes the establishment of healthy stands of diverse tree species less susceptible to host-specific insect and disease epidemics thus preventing a future build-up of fuel in the form of dead timber. Reforestation also ensures prompt re-vegetation which has indirect log-term benefits to wildlife and watershed resources such as optimum tree regeneration in a shorter time frame which promotes quicker establishment of wildlife cover and habitat and helps to protect soil and water values.

Contribute to a continuing supply of timber products by salvaging merchantable timber products before they deteriorate in value.

Based on field review by insect and disease control specialists from the Regional Office in 1990, mountain pine beetle activity is expected to continue to kill 141-215 trees per acre over the next decade. This would correlate to an approximate volume of 9-14 thousand board feet of timber per acre. Salvage harvest to recover timber products before they deteriorate in value is a timber management priority for the Forest Service at this time (Project File, reference Chief's letter of 7/31/92). Examples of salvage harvest opportunities include dead timber, dying timber, and 'high risk' timber which is likely to succumb to insect attack. Areas of lodgepole pine are dead, dying, and 'at risk'. Management delays are likely to result in product recovery losses and reduced socio-economic returns, as well as delays in site recovery. Up to 75 percent of the existing lodgepole pine volume is anticipated to become unmerchantable over the next ten years. The Standard Rate as of 12/10/92 for selling live lodgepole pine is $45 per thousand board foot verses $12 per thousand board foot for dead lodgepole pine (Project File excerpt Forest Service Handbook 2409.22-91-1). This represents a potential loss of $33 per thousand board feet as live lodgepole pine dies. At a mortality rate of 9-14 thousand board feet per acre, the opportunity cost could be $297-$462 per acre before competitive bidding is factored in.

The desired future condition is two-fold:

1) The desired future condition includes salvage of usable timber products that would otherwise be foregone. This is emphasized in the Forest Plan as follows:

To harvest the maximum amount of high risk lodgepole pine marketable, to minimize losses from the mountain pine beetle (Forestwide Management Direction, Goal #16, page II-2).

To harvest lodgepole pine prior to future outbreaks of mountain pine beetle (Forestwide Timber Objective #4, page II-4).

To emphasize management of mature and overmature lodgepole pine during the next ten years to minimize losses from the mountain pine beetle (Forestwide Timber Objective narrative, page II-4).

... to utilize and salvage as much (lodgepole pine) as possible prior to attack by the mountain pine beetle (Forestwide Protection Objective narrative, page II-10).

2) The desired future condition also includes a desire to provide a sustained and programmed availability of timber. This is expressed in both Forestwide Management direction to provide a sustained yield of timber responsive to National and Regional needs, scheduled to encourage a stable base of economic growth in the dependent geographical area, and in the goal of Management Area 12 to produce a programmed yield of timber (Forest Plan, Goal #1, page II-1 and Management Area 12 Goal Statement, page III-48).

The Proposed Action would move the area toward the desired future condition through prompt salvage harvest of lodgepole pine stands which could make an important contribution to the economies of timber-dependent communities at a time when available timber supplies are at critical levels. Additionally, site preparation and reforestation would ensure the future availability of timber.